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Report of the Rubber Technology Conference

International Presentation of Technical Information at London Attracted Worldwide Participation

A. R. Kemp

THROUGH the industrious efforts of the Institution of the Rubber Industry and the whole-hearted cooperation of leading rubber technicians, this unprecedentedly large and comprehensive array of informative papers was brought to a successful completion on May 25.

Anticipating the value of the information released at this conference and the wide interest created through previously divulged plans, INDIA RUBBER WORLD *arranged to publish at the earliest possible time an accurate and comprehensive report prepared by an American rubber technician who was present at the meeting.*

This article includes the official abstracts of the 20 American papers and the outstanding observations of A. R. Kemp, who, as representative of the Bell Telephone Laboratories, presented two papers, and who also acted as official delegate from the Rubber Division, American Chemical Society. Because of the proximity of the conference dates, May 23 to 25 inclusive, to the time of our going to press, this report was transmitted from London by cable.

In the July issue of INDIA RUBBER WORLD, *A. R. Kemp will discuss in greater detail the subject matter presented at the conference. Also in the July number, abstracts of foreign papers will be published. This series of articles will acquaint those who were unable to be present, with the outstanding conference results as interpreted by our official representative.* EDITOR'S NOTE.

WITH an attendance of approximately 500, the London conference, held May 23 to 25 under the auspices of the Institution of the Rubber Industry, was undoubtedly the most remarkable gathering in history for the purpose of exchanging technical ideas relating to the rubber industry. The 107 papers submitted were classified by subject matter into nine groups with their respective number of papers as follows: Applications of Rubber, 15; Durability, 28; Compounding Materials, 6; Physics, 13; Chemistry, 13; General Rubber Technology, 7; Plantation Subjects, 7; Latex, 12; and Synthetic Rubber-like Materials, 6. Because of limited time for the large number of papers submitted, preprints were distributed in advance, thus eliminating the necessity of reading the papers in the sessions and permitting the use of the allotted time for questions and discussion. Sixteen Technical Sessions of ninety minutes each were devoted to units of from six to eight papers, depending upon their relative importance and length. Geographically the 107 papers represented 18 countries, including: England 39; United States 20; Germany 15; Holland 8; France 7; Italy 5; Japan 2; Belgium, Denmark, Switzerland, Poland, Czechoslovakia, Russia, Java, Kuala Lumpur, Scotland, Ireland, and Canada, one each.

Technical Sessions

For each session a chairman and reporter had been previously chosen; the chairmen were selected from the prominent overseas guests and the reporters from English technicians of high standing. The chairman of each session introduced the reporter, the authors as their papers were announced, and those who entered the discussion.

As soon as each session was opened, the reporter presented a résumé of the high lights of the papers in his particular section, thus directing the discussion. He re-

ceived the reports of the contributions to the discussion and will make an official report for later printing in the Proceedings. When introduced, each author replied to questions raised during the discussion of his paper. On May 24 and 25, two technical sessions were conducted at the same time, one in the Hotel Victoria; the other in the Assembly Room, Royal Empire Society.

At the official opening of the conference on Monday forenoon, S. T. Rowe, president of the Institution of the Rubber Industry, introduced Sir William Bragg, honorary president, who made the address of welcome. He also spoke at the luncheon attended by 400 and given on Monday by The Research Association of British Rubber Manufacturers and The British Rubber Producers' Research Association. Mr. Bragg spoke of the value of the rubber industry and emphasized the need of fundamental consideration of the structural and chemical aspects of long-chain, high-polymeric natural materials such as cellulose proteins which basically have a close relation to rubber.

The closing general meeting of the Rubber Technology Conference was held at 4 o'clock on Wednesday, May 25, with all attending. President Rowe expressed his appreciation of the services rendered by Chairman B. D. Porritt and the large I. R. I. committee as well as to the delegates from approximately 70 cooperating organizations for their assistance in making the conference the huge success that he believed it to be.

The official delegates were then accorded the floor, and A. R. Kemp was the first to be recognized by President Rowe. In behalf of the American delegation, Mr. Kemp thanked the Institution of the Rubber Industry and affiliated bodies for their very kind hospitality. He spoke of the great value of technical papers and stressed even a greater benefit from personally meeting many colleagues in rubber technology from the various countries represented. Thus was created a lasting memory of this unique and historical meeting which had made possible many worthwhile friendships. On behalf of the Rubber Division, American Chemical Society, Mr. Kemp invited those present at the conference, to attend the Goodyear Centennial Meeting in Boston next year and promised to give the delegations more information following the Milwaukee Meeting of the Rubber Division in September.

Dr. Conrad, German official delegate, was then introduced and invited those present to go to Cologne in 1940 to attend a similar rubber conference. He was followed by official delegates from other countries who, as he had done, praised the conference and expressed their appreciation to their British hosts.

Social Activities

On Monday evening a reception, by invitation only, was given by His Britannic Majesty's Government at Lancaster House with 400 in attendance. The Rt. Hon. Viscount Hailsham (Lord President of the Council) and Lady Hailsham received the guests. Lord Hailsham acted as patron of the Rubber Conference. He was Lord Chancellor in 1928-1929 and again since 1935; vice president and vice chairman since 1902 of the Polytechnic, which was founded by his father; and leader of the House of Lords and Secretary of State for War from 1931 to 1935. Lancaster House adjoins Buckingham Palace and includes a museum of great interest.

On Wednesday night, May 25, the formal banquet in the Edward VII Rooms, Hotel Victoria, with the Rt. Hon. Viscount Hailsham presiding, was attended by 300 participants in the conference. With Lord Hailsham at the head table were S. T. Rowe, president of the Institution; Sir Harry Lindsay, director, Imperial Institute; Sir George Beharrell, honorary vice president; and 32 official delegates. In short speeches Lord Hailsham and President Rowe stressed the importance and success of the conference. Sir Harry Lindsay spoke of the historical development of rubber and the great benefits from MacIntosh's work and Charles Goodyear's discovery of hot vulcanization, later augmented by plantation developments and technological advances in the industry. Sir George Beharrell responded to his introduction with many colorful and witty remarks.

Outside trips to rubber research laboratories in London were enjoyed by many on Thursday, and those interested spent Friday at the Glasgow Exhibition where the Rubber Pavilion is located.

The entire conference showed evidence of carefully organized preparation; all events were handled smoothly and with little apparent effort. At the social events, official opening and informal luncheon, toasts and presentation of speakers were made with great dignity and formality by an official announcer wearing a red coat. Of the Americans contributing papers, 12 attended the conference and took an active part in the technical discussions. A few others were present who represent American interests abroad. American papers were well received, and every one appeared to be agreeably impressed with the meeting. Many pleasant memories and a closer understanding will result from this international contact.

Abstracts

Application of Thermodynamics to the Chemistry of Rubber. Various thermodynamic functions for purified rubber, isoprene, and the reaction of polymerization of isoprene, including the heat of the reaction, the change in entropy, the change in free energy, and the equilibrium constant, are calculated from data for the heats of combustion and heat capacities of rubber and isoprene. Equations are deduced for the variation of the free energy of the polymerization reaction with variations of pressure and temperature. The results show that below 800° K. rubber is thermodynamically more stable than isoprene and that the reaction will proceed in the direction of formation of rubber. At any temperature below 600 to 700° K. the reaction will go practically to completion. Above 800° K. the reaction tends to go in the opposite direction, favoring depolymerization. The free energy of the reaction determines suitable or optimum conditions under which the reaction will take place, but not the rate of the reaction. Evaluation of the free energies of formation of other substances with which rubber may react or from which it may be made will permit the conditions for these other chemical reactions to be predicted. With these conditions in view, searches can then be made for catalysts which will bring the desired reaction into equilibrium. N. Bekkedahl, National Bureau of Standards, Washington, D. C.

Some Properties of Two Vulcanized Pure Gum Compounds at Low Temperatures. This paper deals with the tensile properties, hardness, and behavior on

rapid cooling to low temperatures of two pure gum compounds, one containing high sulphur, the other normal sulphur. The apparatus used in determining tensile properties at low temperatures was the modified Scott testing machine, equipped with the testing tank already described by the author in previous publications, plus an external cooling chamber containing a circulating liquid to produce the low temperature desired.

Both pure gum compounds became board-like and brittle within a few minutes when cooled to —60° C.; yet when tested at this temperature they had an elongation at break of over 500% and tensile strength of over 5,000 pounds per square inch.

Relatively high combined sulphur, i.e., up to over 8% on the rubber, was accompanied by a marked increase in hardness, even at temperatures no lower than —30° C. Substitution of deproteinized rubber for smoked sheet appeared to produce greater resistance to hardening at temperatures down to —40° C.

Unvulcanized, unmilled, smoked sheet showed a greater resistance to hardening on rapid cooling than the vulcanized compounds, at all temperatures used. This phenomenon, however, is not to be confused with the ordinary freezing of rubber, which is commonly observed at temperatures above —30° C. A. A. Somerville, R. T. Vanderbilt Co., New York, N. Y.

Composition and Colloidal Properties of Balata Latex. The composition and colloidal properties of two types of balata latex, "white" and "red," are described; the former is superior owing to its higher content of hydrocarbon. Balata latex cannot be coagulated by acids or salts; this great stability is due to a water-soluble protective serum constituent. Alcohol or acetone coagulates balata latex. Balata latex particles are spherical, the diameter ranging from about 0.1 to 2.5 microns, average about 0.5 micron. The "resins" appear to be present within the particles, which contain also about 18% of water. The "resins" from both types of balata latex are colorless viscous liquids from which β-amyrin acetate crystallizes on standing. Differences between the "resins" from the "white" and "red" latices are pointed out. The serum constituents have been separated into protein, carbohydrate, gummy substances, and mineral matter; tannin and amino-acids were also detected. A complete analysis of balata latex ash is compared with that of *Hevea* latex ash; the former contains more CaO, Na_2O, and MgO and less K_2O and P_2O_5 than the latter. Data of improved accuracy are given for the density, refractive index, dielectric constant, and heat of combustion of balata hydrocarbon. The changes in refractive index of gutta and balata hydrocarbons with temperature show that these crystallize between 35° and 37° C. A. R. Kemp, Bell Telephone Laboratories, New York, N. Y.

Dielectric Measurements in the Study of Carbon Black and Zinc Oxide Dispersion in Rubber. The dielectric constant, power factor, conductivity, and D.C. resistivity of rubbers compounded with various grades of zinc oxide and carbon black have been measured. The electrical properties have been shown to depend upon the particle size, type, and purity of the added ingredients and on the nature of their dispersion in rubber.

French process zinc oxides of the smallest particle size were found superior; while water-soluble impurities were found to have a deleterious effect. In the case of carbon, "soft" blacks are distinctly superior to gas blacks in respect of degradation in electrical quality. In general the smaller the particle size and the better the dispersion, the greater is the increase in dielectric constant and conductivity and the greater is the decrease in resistivity.

Addition of as little as 4.5 parts of a gas black, dried at 166° C., to 100 parts of rubber in the base stock increased the dielectric constant and power factor; while addition up to nine parts did not affect the resistivity. In no case was improvement in dielectric properties observed as a result of adding carbon black. As little as 2.5% of gas black in Paragutta increased the power factor by 24%. Poor dispersion of the black, as compared with normal dispersion, had less effect in raising the dielectric constant and power factor and in lowering the resistivity, but the results depended on the volume of black added.

Suggestions are made for using the dielectric measurements to differentiate sharply among different gas blacks, e.g., in tire treads. A. R. Kemp and D. B. Herrmann, Bell Telephone Laboratories, New York, N. Y.

A Survey of Methods for Evaluating Carbon Blacks. The development of methods for testing the channel-process carbon blacks used in rubber is described. The original methods based on the physical and chemical properties of the blacks themselves proved unsatisfactory because the results did not correlate with the processing or reenforcing properties of the blacks. Attention was therefore directed to tests of the blacks in unvulcanized and vulcanized rubber, but still the results did not correlate closely with the performance obtained in service. Recent trends have been toward either increasing the sensitiveness of existing laboratory tests or devising new tests to detect and measure characteristics of the blacks which previous tests did not indicate. A number of such tests are described, including the St. Joe compression flexometer test, the pendulum impact and rebound test, the T-50 test, and tests of dielectric properties. These new tests show up differences between blacks that give similar stress-strain properties; data illustrating this point are given. The numerous physical and chemical characteristics of blacks that have been investigated are tabulated, information being given on the range of observed values of each property and its influence, so far as known, on the behavior of the black in rubber. I. Drogin, J. M. Huber, Inc., New York, N. Y.

Mathematics of Water Absorption by Rubber. A distinction is drawn between two types of water absorption by vulcanized rubber—that which reaches an equilibrium and that which appears to continue indefinitely. The existence of these two types of absorption makes it difficult, if not impossible, to present the time absorption curves by one type of mathematical expression. Equations which have been proposed to represent this curve are reviewed and their relationship to Fick's law of diffusion is pointed out. The analogy between water absorption and heat conduction is discussed; on the basis of this analogy the "diffusion constant" of water in rubber has been expressed as a function of two variables, leading to a modified form of Fick's law. Values for the order of magnitude of the "diffusion constant" at the controlling point (100% relative humidity) are deduced from independent experimental data and shown to agree satisfactorily. The conclusions arrived at are similar to those which Daynes deduced in a different manner. A new empirical relation for water absorptions that reach an equilibrium is deduced, viz.: $X/X_\infty = C \log (T/A^2) + B$, where X = absorption after time T by a sheet of thickness A, X_∞ = equilibrium absorption, and B and C are constants. Curves for various rubbers in distilled and salt water show that this law applies over a considerable part of the ab-

sorption process. The value of C, about 0.33, appears to be independent of the rubber and absorption medium. The power law $X = KT^N$ seems to be the best representation of absorptions that reach no apparent equilibrium; N, however, may differ appreciably from the previously reported value of ½, observed values varying from 0.25 to 0.6. J. T. Blake and H. A. Morss, Jr., Simplex Wire & Cable Co., Cambridge, Mass.

Effect of Light on Unvulcanized Rubber. When unvulcanized rubber is exposed to light in the presence of air, it develops a tackiness which may proceed far enough to cause partial liquefaction of the rubber. The tackiness is accompanied in many cases by a Russell effect. It does not occur in the absence of air, and the nature of the light is unimportant. The effect of various sources of light is only a difference in the amount of time required to produce the same amount of tackiness. The development of tackiness does not require ultra-violet light and is not due to ozone. The action is without doubt an oxidation of the rubber and is accompanied in many cases by the formation of peroxides.

This production of tackiness under the influence of light is susceptible to the action of catalysts of both the positive and negative varieties. One of the surprising features of the work is that the materials used commercially as antioxidants and which are used regularly in vulcanized rubber are active agents in accelerating the development of tackiness. On the other hand there are a number of materials which will retard very effectively the development of tackiness. In many cases these materials will suppress completely the positive action of the commercial antioxidants. These results should have important influences on our theories of the action of antioxidants and, perhaps, bring more emphasis on the distinction drawn by Dufraisse between *antioxidants* and *antioxygens.* J. T. Blake and P. L. Bruce, Simplex Wire & Cable Co., Cambridge, Mass.

Values of the Physical Constants of Rubber. A critical survey has been made of published values for 16 of the principal physical constants of rubber in the fields of mechanics, heat, optics, and electricity: namely, dimensions of unit cell, density, expansivity, thermal conductivity, specific heat, heat of fusion of crystalline rubber, heat of combustion, volume compressibility, Poisson's ratio, velocity of sound, refractive index and dispersion, stress-optical coefficient, dielectric constant, power factor, and conductivity. The value for each constant which seems to be the most reliable has been indicated, and, when necessary, corrected to the standard conditions of normal atmospheric pressure and a temperature of 25° C. Temperature coefficients are given when possible. The values are given for rubber in four different forms: the purified hydrocarbon, commercial raw rubber, soft vulcanized rubber containing 2% combined sulphur, and hard rubber containing 32% combined sulphur. Relationships between expansivity and change of density with temperature, expansivity and change of refractive index with temperature, and refractive index and dielectric constant are discussed. L. A. Wood, National Bureau of Standards, Washington, D. C.

Mastication of Rubber: A Study of Some of the Oxidation Processes Involved. Experiments are described which show that the rate of breakdown of rubber in a laboratory internal mixer is a minimum at about 240° F., the rate being increased four- or five-fold by raising or lowering the temperature 80° F. The high-temperature change is probably similar to the oxidation which occurs when rubber is heated in air. The low-temperature change may involve mechanical activation of rubber. Both changes are accelerated by increasing the oxygen concentration. Experiments on the mastication of rubber in the presence of various added materials have shown that nitroso-compounds act as powerful stiffeners, that the effect of most commonly used "softeners" is small compared with that of change in mastication temperature, and that some vulcanization accelerators, hydrazines, and thiophenols appear to act as true mastication accelerators or oxidation catalysts. W. F. Busse and E. N. Cunningham, Physical Research Laboratory, The B. F. Goodrich Co., Akron, O.

The Distribution of Combined Sulphur in Vulcanized Rubber and Its Bearing on the Sulphide Linkage Theory of Vulcanization. An account is given of experiments made to test the theory that the characteristic properties of vulcanized rubber result from the formation of sulphide (thio-ether) linkages between adjacent rubber molecules. Rubbers vulcanized by sulphur, with and without organic accelerators, and by a thiuram disulphide were peptised, i.e., brought into solution by a peptising agent, and the dissolved material separated into fractions by controlled precipitation with alcohol. The sulphur content, physical nature, and solubility of these fractions are recorded. The results show that: (1) vulcanized rubber can be peptised under conditions that apparently do not rupture a sulphide linkage; (2) no direct relation exists between the physical properties of the vulcanizate and either the combined sulphur content or the ease of peptisation; (3) combined sulphur appears to assist the solvation and peptisation of rubber; (4) rubber having the best physical properties is the most heterogeneous as shown by the variation in sulphur content among the various fractions, whereas the sulphide linkage theory would suggest that an even distribution of sulphur would produce the best physical properties; (5) evaporation of solutions of certain fractions from peptised vulcanizates gives insoluble vulcanized films with considerable tensile strength, showing that linkage by primary forces is not necessary for producing the vulcanized condition. It is concluded that there is no direct evidence in support of the sulphide linkage theory of vulcanization. I. Williams, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Purified Latex and Rubber. Literature on the purification of rubber, with special reference to water-absorption, and on water-absorption is reviewed. Experiments are described on the purification of rubber by various treatments including creaming, centrifuging, dialysing, treating with alkali; coagulating after dilution, and flocculating. The rubbers obtained have been examined as to their nitrogen content, water-soluble matter, ash, acetone extract, vulcanizing properties, and water-absorbing capacity both before and after vulcanization. It is concluded that the most effective purification is obtained by alkali-hydrolysis, though the product is readily oxidizable. Centrifuging is more effective than creaming and with several repetitions yields a product similar to that from the alkali treatment. Water-absorbing capacity is related to the amount of protein, ash, and water-soluble substances present in the rubber, being proportional to protein content in unvulcanized rubber and to water-soluble content in vulcanized rubber.

The rate of vulcanization, tensile strength, modulus, and aging resistance of purified rubber show a general decrease with decreasing content of non-rubber substances, a tendency more marked in centrifuged and creamed latex rubbers. R. J. Noble, Malden, Mass.

The Direct Determination of Oxygen in Rubber. The Adaptation of the ter Meulen Method to Rubber and Its Application to the Study of Aging. The methods hitherto used for studying the oxidation of vulcanized rubber during aging are reviewed. The ter Meulen method for the direct determination of oxygen in organic compounds has been modified to apply to the analysis of raw and vulcanized rubber. Data are given for the oxygen contents of raw rubber and purified rubber hydrocarbon, and it is shown that there is a small, but definite increase during the mastication of rubber on the mill. The method has been applied to the study of the aging, in the Geer oven and oxygen bomb, of vulcanized rubbers containing various accelerators and antioxidants, in some cases with addition of copper oleate. For a given tensile deterioration the increase in oxygen content is greater in the bomb than in the Geer oven. In the bomb the increase in weight is about equal to the weight of oxygen absorbed, but in the Geer oven it is smaller owing to volatilization of oxidation products. The effectiveness of an antioxidant in retarding oxygen absorption agrees well with its ability to retard tensile deterioration. During the early stages of bomb aging tensile deterioration is a linear function of oxygen absorption; for stocks containing diphenylguanidine and antioxidants absorption of 1.2% oxygen produces about 50% drop in tensile strength, but this relationship varies according to the accelerator and the presence or absence of an antioxidant. H. I. Cramer, I. J. Sjothun, and L. E. Oneacre, Department of Chemistry, University of Akron, Akron, O.; Firestone Tire & Rubber Co., Akron, O.

Ketone-Amine Products as Rubber Antioxidants. Two methods of preparation of ketone-amine condensation products are described. Seventy-four such compounds have been prepared and examined in a high-percentage carbon tread stock, tests being made, before and after oven aging, on tensile strength and resistance to flexing. Sixteen of the products are shown to possess favorable antioxidant properties; 24 are of moderate value only; and 34 are of poor effect or worthless. It is difficult to trace any general relationships between chemical structure and antioxidant effect, but the following conclusions seem justified by the results. Products with the greatest antioxidant effect are probably derivatives of dihydroquinoline; while those of less value are probably acetone-anil types. Ortho-substituted amines condensed with various ketones, and aryl-ketones condensed with various amines are consistently weak or valueless as antioxidants. Acidic substituted groups have adverse effects. The best results throughout are obtained with acetone as the ketone component. R. L. Sibley, Monsanto Chemical Co., Rubber Service Laboratories Division, Nitro, W. Va.

Survey of the Electrokinetics of Rubber Latex. The electrokinetics of rubber latex are reviewed in relation to electrical coagulation, electro-deposition, electrical concentration, and the rubber particle surface layer. New experiments are described on the cataphoretic velocity, hydrogen ion concentration, and specific conductance of various latices. The results indicate some inter-relationships and show the influence of buffer solutions and preservative alkalies. Bearing of the phenomena on the observed shape of the rubber globule and on the mechanism of latex vulcanization is discussed. E. A. Hauser and M. Bender, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

The T-50 Test for State of Vulcanization. II. The disadvantages of the older criteria of state of vulcanization, e.g., free or combined sulphur or tensile properties, and the advantages of the T-50 test for this purpose are pointed out. The original and modified methods of carrying out this test are described, and an account is given of experiments on the relation between T-50 and the combined sulphur (calculated on rubber content) and also the combined sulphur corrected for formation of zinc sulphide in the case of mixings containing zinc oxide; tensile test data are given also for comparison. In absence of zinc oxide there is a close correlation between T-50 and combined sulphur for vulcanizates with different accelerators and times of vulcanization. In presence of zinc oxide, however, the relationship varies according to the accelerator, and this is still true when the combined sulphur is corrected for sulphur present as zinc sulphide. W. A. Gibbons, R. H. Gerke, and G. R. Cuthbertson, General Laboratories, United States Rubber Products, Inc., Passaic, N. J.

An X-Ray Study of Rubber Hydrochloride. Rubber hydrochloride has a crystalline X-ray structure. By a study of the transition from the amorphous structure of unstretched rubber as hydrogen chloride is added, it is concluded that the reaction is not altogether straightforward, but that a certain amount of cyclization occurs. The crystalline pattern of rubber hydrochloride was obtained for products prepared by a variety of methods. Balata hydrochloride, however, gave an amorphous pattern.

The effect of temperature on the crystal structure was investigated. The pattern changes to an amorphous one at 110° C. Recrystallization requires either a long time or a loosening of the structure, by means of solvent for instance. The presence of a comparatively large amount of solvent does not destroy the crystalline pattern. It is suggested that the solvent assists crystallization unless enough is present to separate the rubber hydrochloride molecules beyond the range of the strong orienting forces which evidently exist.

At temperatures above 90° C. rubber hydrochoride becomes very elastic and can be racked. Curves illustrating the phenomena are given. The X-ray diagram of racked rubber hydrochloride is a typical fiber diagram. The large spacings of this diagram are investigated, and a strong one of 82 A° is found.

The diagram of racked rubber hydrochloride is used to determine the lattice spacings and the crystal structure. The unit cell is orthorhombic with dimensions $a = 11.9$ A°, $b = 9.1$ A° (fiber axis), and $c = 10.4$ A°. The effect of the chlorine atoms is to shorten the rubber hydrochloride chains as compared to normal, zig-zag, paraffin chains. S. D. Gehman, J. E. Field, and R. P. Dinsmore, Goodyear Tire & Rubber Co., Akron, O.

Rubber Vulcanizing Properties of Colloidal Carbons. Contrary to general statements in the literature, colloidal carbons have been found to accelerate the vulcanization of rubber-sulphur mixings and not to retard it.

Experiments are described on the use of several types of carbon in mixings accelerated with litharge, diphenylguanidine, and mercaptobenzthiazole, and disturbances due to selective absorption by carbon of accelerator, stearic acid, or zinc oxide are pointed out. The disturbance is greatest with basic accelerators, less with acidic accelerators, and least with litharge. The phenomena are discussed in connection with the pH value of the carbon and its absorption of cobalt, manganese, and lead from suitable solutions. It is suggested that each carbon presents an individual problem, governed by its pH and particle size, in respect of its absorption of fatty acid, zinc

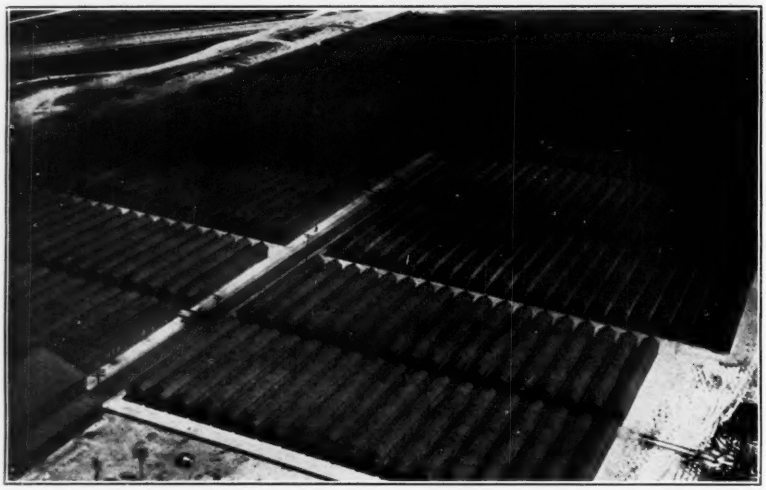
(*Continued on page* 47)

Carbon Black Manufacture

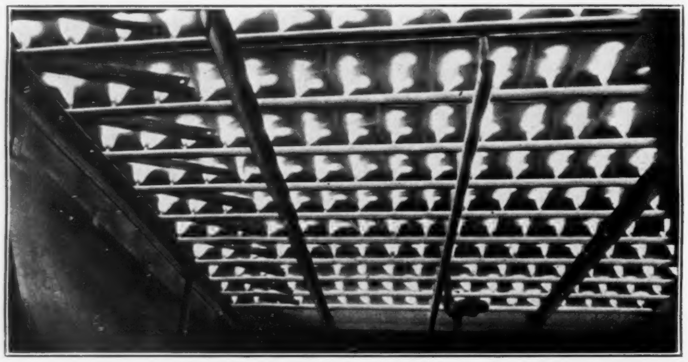
From Gas to Reenforcing Pigment at Continental's Plant

C. R. Johnson [1]

WHEN the Continental Carbon Co. made its plans in the Fall of 1936 for the construction of its mammoth carbon black plant at Sunray, Tex., to burn 70,000,000 cubic feet of gas and produce 90,000 pounds of carbon black per day, it was considered desirable as an integral part of the project to conduct a survey in the rubber industry to determine what the current demand was in terms of specifications and also what improvements in qualities were desired by rubber chemists as a future trend from the consumer's point of view.



Bird's-Eye View of Continental Plant



Gas Flames inside Burner House

The wisdom of this approach is obvious when one considers the unique opportunity which the Continental Carbon Co. possessed to make a fresh start in plant design, holding to features which experience had shown to be good and discarding those found unsatisfactory.

One basis of design was decided upon at the outset, to secure maximum flexibility of the plant in respect to varieties of carbon black which could be produced. Each unit of the seven was planned so that its production is kept separate through all steps of the process until finally packed. This permits independent operation in all phases including control of gas flow, drafting, air separation, and agitation.

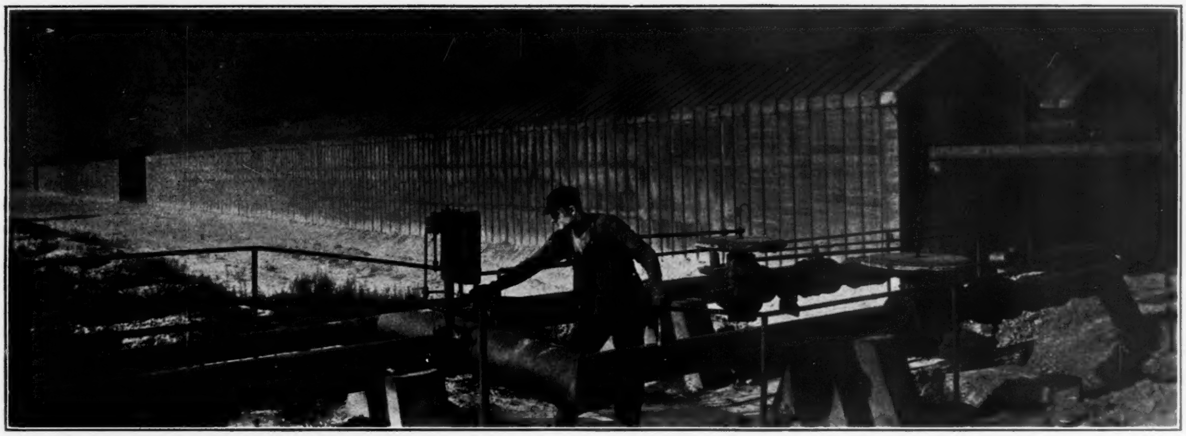
Consumer Specifications

Our survey in the rubber industry revealed a very wide range of definition of qualities desired all the way from "carbon black is carbon black" to well-defined specifications to establish the grade. Each company has evolved its own methods of evaluation, using different formulas, tests, and criteria, but in all cases these methods were intended to establish whether the product received from a new source or in consecutive deliveries was like the grade which they had adopted for their standard factory practice.

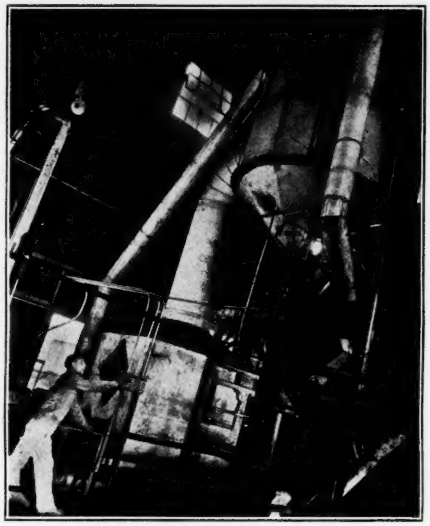
Those with less definite specifications stated their needs in terms of slow or fast curing rate. Others defined requirements with reference to

Unit Alleyway Showing Black Conveyers

[1] Technical director, Continental Carbon Co., 295 Madison Ave., New York, N. Y.



Gas Meter and Pressure Regulating Valve



Air Separator for Removing Grit

ease or difficulty of processing. It appears that processing characteristics are receiving much more attention and study than a few years ago. Plant studies have shown, for example, that variations in power consumption, time of mixing, and extrusion rate occur with various types of rubber blacks. Naturally power savings and increased equipment output are desirable provided all else is equal. In some reports tire test evidence shows that economies gained by the use of easier processing black are obtained at the expense of treadwear. Others claim to have evidence that no sacrifice in treadwear occurs with easy processing black. It is a question which should be explored very carefully, with tire tests as the final arbiter before safe conclusions can be drawn.

Overslipping Heavy Compressed Black

Influence of Gas Composition

In designing a carbon black plant, composition of natural gas available to the plant is an item around which other features of design are fitted. In Texas where the greatest production of carbon black now occurs, state laws establish permissible use of natural gas for carbon black manufacture. The authority controlling oil and gas production in Texas has established definitions of what constitutes an oil or a gas well according to the ratio of gas and oil produced from a given well. The purpose of the Texas authorities to conserve sweet gas for industrial use and delivery to pipe lines since the sour gas is not suitable for domestic use. Gas is classified as sweet or sour according to its content of hydrogen sulphide, and gas containing over five grains per 100 cubic feet is classified as sour. Only sour gas from designated gas wells may be used for burning to carbon black; however sweet gas produced by oil wells can be utilized.

Before delivery to a carbon black plant, it is customary to pass the gas through a gasoline plant for extraction of light gasoline fractions for use as casing head gasoline or as liquid gas for domestic use. This removes largely the propane-butane-pentane fractions from the gas and leaves a mixture chiefly methane and ethane with small fractions of the above-mentioned higher hydrocarbons. From the standpoint of the carbon black producer, the retention of the higher hydrocarbons would be desirable as these constituents contribute to higher yield of carbon black.

Laboratory Rubber Mixing Mill

The constituent analysis of the gas available to the carbon black plant influences other design features such as tip style and slot width, tip spacing, tip distance from the channel, size of building, number of channels to the building. It is upon the chosen combination of all of these factors that the quality of the final product depends as to rate of cure, modulus, tensile, processing, resistance to abrasion, and other properties.

Manufacturing Process

The seven units of the Continental plant with packing houses, warehouses, railroad siding, and employes' houses occupies a site of 160 acres. Each unit is made up of 42 burner buildings, 160 feet long and 12 feet wide arranged side by side in two rows with a 16-foot unit alleyway between the rows. The units are placed on each side of a main alleyway, 40 feet wide, in which are placed the main conveyers for moving the black to the packing house.

The entire plant is powered with electric motors with interlocking controls and furnishes a contrast with older practice using gas or compressed gas engines and belt drives. For those who are familiar with old-time packing rooms, the Continental packing room shows a remarkable contrast in cleanliness and freedom from dust due to many design improvements.

The black, as scraped off the channels in each burner house, drops through chutes into a small screw conveyer which moves it out into the unit alleyway where it is delivered to a larger screw conveyer, which in turn delivers the black to a main alleyway conveyer that transports the entire production of that unit to the packing house.

Here it is passed through a carefully controlled air separator which eliminates coarse particles, grit, or foreign matter. Control in this operation is affected by a combination of fan speed and damper regulation. The black at this stage is extremely light and fluffy and not suitable for packing or use. It must be agitated to remove air and condense the bulk.

Uncompressed Black for Ink and Paint

This operation condenses the black to the commercial grade known as "uncompressed." In this form it has an apparent density of about 13 pounds per cubic foot. Black in this form is used in the paper, ink, and paint industries, as it is more easily dispersed in the various liquid media used in these applications.

Compressed Blacks for Rubber Compounding

To reduce dust in mixing for the rubber industry, blacks are compacted to different degrees such as semi-compressed, heavy compressed, or as dustless pellets. To obtain the several compressed forms the black is packed in strong paper sacks, which, however, leak a little air and are compressed in hydraulic or mechanical presses in one or two stages, depending on the degree of compression desired. The most popular form of compression is the heavy or double compressed, in the familiar six-inch by six-inch by 22-inch package containing 12½ pounds. The packing is completed with a snugly fitting black overslip to furnish additional protection for shipping. Dustless pellet black is packed in paper bags with overslips or conveyed to an overhead storage tank for shipment in bulk tank cars.

Laboratory Control Tests

The laboratory maintained by the Continental Carbon Co. at its plant is completely air-conditioned to insure standard testing conditions. It is equipped for rubber testing and other tests necessary to control the quality of the black.

A comprehensive scheme of daily tests is carried out to insure that quality of the black is maintained. The production of each unit is held intact until approved by the laboratory. Daily tests are made to hold ash and grit within specifications. Several times each day the product of each unit is tested as to its capacity to absorb D.P.G. This test, when correlated with rubber tests, serves as a rapid control for identifying black which is out of line in rate of cure.

The T-50 test developed in the United States Rubber Co. laboratories is used to evaluate the black in regard to state of cure against standard black. A Firestone plastometer of the Dillon type is being utilized to study the processing qualities of various blacks of standard production and experimental types which are being developed. Dustless pellet production, in addition to the foregoing tests, is given screen tests to hold the fines to established low limits. It is tested for apparent density to insure that pellets are sufficiently firm to withstand handling and shipment. Flow tests are also a part of the control scheme for dustless black. It is the purpose of this laboratory to control the quality of production and to interpret customers' requirements so that deliveries will conform thereto.

Colors for Kitchen and Bathroom Accessories[1]

DIFFICULTY in securing a satisfactory color match between articles purchased for use in kitchens and bathrooms, where color harmony is essential, to pleasing appearance, has long been a source of inconvenience to purchasers. This difficulty is greatest when items made of different materials are produced by different manufacturers. Not only has this inconvenienced purchasers, but it has been a source of trouble and loss to producers and merchants through slow turnover, multiplicity of stock, excessive returns, and obsolescence.

These reasons led to the adoption of color standards which became effective for new production on January 1, 1938. Colors for Kitchen Accessories, Commercial Standard CS62-38 lists the colors adopted, with numerical designations, as follows: SKC-00, white; SKC-15, kitchen green; SKC-31, ivory; SKC-41, delphinium blue; SKC-45, royal blue; SKC-70, red. A similar standard, CS63-38, covering colors for bathroom accessories, lists the colors adopted, with numerical designations as follows: SBC-00, white; SBC-12, bath green; SBC-20, orchid; SBC-31, ivory; SBC-35, maize; SBC-40, bath blue; SBC-45, royal blue.

Reference samples in the form of enameled-iron plaques are available from the National Bureau of Standards and comprise ten colors which include the six colors adopted for kitchen accessories and the additional colors for bathroom.

Copies of these standards may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5¢ each.

[1] Abstracted from *Technical News Bull.*, Nat'l Bur. Standards, Jan., 1938, pp. 8-9.

Distributers' Tire Stocks

In the United States, April 1, 1938[1]

THE results of the quarterly survey of retail stocks of automobile tires and inner tubes, as of April 1, 1938, are shown below in comparison with summary data for preceding surveys, the bases and methods described in previous reports having been used in calculating the stocks held by the following three groups of distributers: 1. Dealers holding over 100 casings each on April 1, 1937. 2. Distributers through oil-company chains and some independent filling stations. 3. Manufacturer-owned, mail-order house, and other large retail chains.

Distributers' Stocks Indicated by Surveys

The following summary table covering estimated total stocks held by each group of distributers in surveys made since 1936 shows total stocks of casings on April 1, 1938, lower than at any survey date since April, 1936, and lower than on the corresponding 1937 date by 770,000. It appears, however, that an increase has occurred during the last quarter in the estimated total stocks of inner tubes, although tube stocks are reduced more than a million under April, 1937.

Stocks of casings held by dealers are about the same amount as on January 1, 1938, a decline being indicated in the holdings of oil company distributers; while other mass distributers operating retail chains have increased stocks.

	Thousands of Casings			
1936	Dealers	Oil Companies	Other	Total
April 1	2,321	1,543	1,890	5,754
October 1	2,179	1,757	2,110	6,046
1937				
April 1	2,465	1,853	2,304	6,622
July 1	2,161	1,996	2,299	6,456
October 1	1,929	1,774	2,289	5,992
1938				
January 1	1,938	2,115	1,920	5,973
April 1	1,932	1,869	2,051	5,852

	Thousands of Inner Tubes			
1936	Dealers	Oil Companies	Other	Total
April 1	3,000	2,040	1,902	6,942
October 1	2,710	2,097	2,228	7,035
1937				
April 1	3,155	2,019	2,170	7,344
July 1	2,602	1,960	2,129	6,691
October 1	2,268	1,957	2,038	6,263
1938				
January 1	2,280	2,127	1,717	6,124
April 1	2,585	1,918	1,728	6,231

Stocks of dealers holding less than 100 casings each are not included in these estimates; the number of tires held by such smaller dealers is estimated by trade statisticians to range between one million and one-and-a-quarter million, at different seasons. The April 1 date would normally be a period of increased stocks for such small dealers.

Dealers Reported Stocks

The following table compares the stocks reported by 1,119 dealers for 1,612 stores in the current survey, with the stocks reported by the identical firms in the survey of January 1, 1938, when their stores numbered 1,522. These dealers are divided into three groups; those holding up to 200 casings each show stocks reduced from January to April, those holding larger quantities show stocks increased, but the overall net change is a slight stock reduction in casings and a larger increase in inner tubes, as indicated by the index numbers, and as reflected in the estimates in tables shown above.

Number of Casings January 1	Number of Dealers	Stores		January 1, 1938 Casings	Tubes	April 1, 1938 Casings	Tubes
Up to 200	667	790	(768)	77,262	102,669	72,469	102,382
200 to 499	299	446	(440)	90,024	101,308	90,893	107,746
500 and over	153	376	(314)	185,325	203,071	188,207	230,986
Total	1,119	1,612	(1,522)	352,611	407,048	351,569	441,114

Reports were also received from 311 additional dealers who did not report in January, and the stocks held in their 435 stores amounted to 113,728 casings and 181,843 inner tubes, making a total of 465,297 casings and 622,-957 inner tubes reported by 1,430 dealers operating 2,047 stores on April 1, 1938.

	January 1 Casings	Tubes	April 1 Casings	Tubes
Index Numbers	86.1	101.3	85.8	117.4

Oil-Company Distributers' Reported Stocks

Reports were received from 63 firms distributing tires through chains of filling stations and sometimes also through independent stations. One large firm formerly submitted a composite report, but data included below for April were received from the distributing companies through which it operates. A comparison of stocks received from identical firms reporting about a quarter of a million tires indicates the considerable decline from January 1 to April 1 in oil-company stocks reflected in the index numbers, which show the trend of stocks more accurately than the other data included below.

Actually Reported Stocks	January 1	April 1
Number of firms	43	63
Casings	1,166,471	771,897
Inner tubes	1,173,982	792,289
Index Numbers		
Casings	128.1	113.1
Inner tubes	128.9	116.2

Other Mass Distributers Reported Stocks

Reports were received from seven tire manufacturing companies covering stocks held in company-operated retail outlets, and from six other mass distributers covering their total stocks on hand as of April 1. Stocks reported here by manufacturers are presumably mostly also included in manufacturers' inventory as reported by The Rubber Manufacturers Association, Inc. The number of stores reported by tire manufacturers for April was 2,067; other firms 1,828. Reported stocks of casings were increased somewhat; while stocks of inner tubes were reduced, as indicated by the index numbers, in which the reports from identical companies are com-

(*Continued on page* 45)

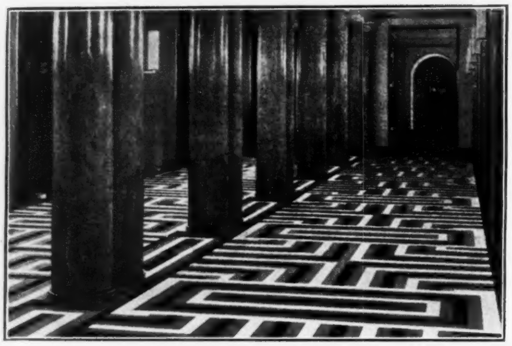
[1] Special Circular No. 3,675, Rubber Section, Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Laying and Care of Rubber Flooring

Practices Found To Be Satisfactory in Finland

W. von Denffer[1]

THE life and satisfaction to be obtained from rubber flooring depends very largely on the care exercised in preparing the sub-floor and the methods used when laying the rubber as well as the use of favorable cleaning methods and the frequent application of suitable protective coatings. Many installations are required to withstand exceptionally cold temperatures. Proper application of a suitable wax will preserve the rubber from dirt and excessive wear. Details as to the methods which should be followed in connection with the installation and maintenance of rubber flooring will be discussed.



Corridor in the Finnish Parliament House

Methods of Installation

The laying of rubber flooring may be done in many different ways, depending upon the location, the intended purpose, and the particular laying conditions involved. In every case the sub-floor should be quite dry, hard, level, and clean. It should be dry because rubber cement does not adhere well to a damp sub-floor, and although adhesion may seem to have taken place when laying, sooner or later the rubber will become detached. Every sub-floor has to be tested for dampness. The simplest test is to attach a square meter of rubber flooring to the sub-floor with rubber cement. After 24 hours the flooring is torn off, and, if the section of the sub-floor which had been covered is darker than the remainder, the sub-floor is damp.

In a more exact test method a few calcium chloride crystals (a quantity equal to six lumps of sugar) are placed on the sub-floor and covered with a glass bowl or tumbler, the edges of which should be sealed with putty or rubber solution to exclude the outside air. If in the course of 48 hours the calcium chloride has only half melted through the absorption of moisture, the flooring may be laid. Should, however, more than half have melted, the sub-floor is too damp for laying. This test should be carried out in a number of places on the sub-floor.

Hardness is necessary because all stress sustained by the flooring is also imparted to the sub-floor. Thus the flooring becomes loose wherever the sub-floor gives way under impact or other form of stress.

If the sub-floor is not level, the flooring will not adhere securely or wear evenly. Also each irregularity of the sub-floor shows in the flooring, particularly when the latter has a highly polished surface. As rubber cement does not adhere well in the presence of dirt, oils, fats, paints, and varnishes, the sub-floor should be thoroughly cleaned before laying.

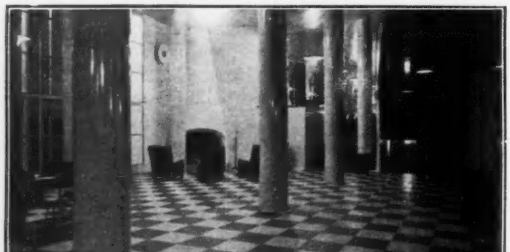
There are five types of sub-floor that are discussed below.

Stone or cement Mosaic should be first roughened by applying a thin coat of varnish over which fine sand is sprinkled while the varnish is still wet. When this varnish is dried out, the whole surface must be filled in level.

Cement sub-flooring should be at least one-inch thick and be made from three parts of finely sieved sand and one part of cement. The surface is prepared by steel polishing.

When asphalt is used, it should be Trinidad asphalt and not coal tar. The flooring should be made about 15 mm.

[1] Manager of rubber flooring branch of the Suomen Gummitehdas O/Y Co., with plants at Nokia, Savio, and Nurmi, all in Finland.



A Hotel in Pohjoin Hovi, 30 Km. from the Arctic Circle

A Shop in Nurmi, Finland

thick, and after leveling, the surface must be roughened with fine sand. The rubber flooring adheres extraordinarily well following this preparation.

Composition sub-floor is unreliable as it easily chips off.

Flooring should not be laid on a sub-floor of fresh wood owing to its dampness which causes the boards to shrink upon drying. A sub-floor of old wood should be dry, planed, jointless, and have the nails countersunk. If these conditions cannot be obtained, 4 mm. plywood may be nailed on the top of the sub-floor. If a floor of old parquetry is to be covered, it must be planed off with a parquet planing machine, or if this planing cannot be done on account of too great irregularities, filling in has to be resorted to. It should then be roughened and twice filled in.

Any sub-floor may be filled in. A suitable filler is made in the following manner. By volume 100 parts of a mixture of water and chalk are blended with 10 parts of hide glue or a solution of sinews and 20 parts of a good floor varnish. Just prior to using, gypsum is added in sufficient quantity to give the filler the consistency of mortar.

If the irregularities in the surface are only slight, one "filling in" may be sufficient; otherwise two or three may be necessary. It takes 24 hours for each coat to dry thoroughly.

Glue or ordinary rubber solutions should not be used in laying. A thick rubber cement, self-vulcanizing at room temperature, is suitable for this purpose.

The sub-floor is swept clean, and both the sub-floor and the rubber flooring are coated with rubber cement twice (three times if the floor is to be subjected to heavy wear). Each coat is dried so that when the cement layer is touched, the cement sticks to the finger, but not sufficiently to adhere to the finger when removed. After the flooring is in place, it should be rolled so as to exert lateral and vertical pressure and thus force out any entrapped air. The rubber flooring is then cleaned, dried, and treated two or three times with a wax emulsion.

Care and Maintenance

It is of great importance that rubber flooring should be properly cared for and kept clean from the very beginning.

Benzole, petrol, naphtha, petroleum, turpentine, oils, fats, caustic soda, and strong soaps will eventually destroy the rubber flooring, and, therefore, they should not be used for cleaning.

Before wax is applied to the floor it should be cleaned in the following way. All the loose dirt is swept up, and the floor washed with a solution of cold water and a good soap, using a rough rag. Only a small section is washed at a time; the lather is removed with clean cold water out of another vessel.

Hot water should not be used, and pails containing hot water should not be placed on the flooring. After washing the flooring should be allowed to dry for one hour before the wax emulsion treatment is begun.

The latest and best substance for protecting rubber flooring is a hard wax emulsion. This may be applied by means of a hair brush or a rag. It has been found that an absorbent rag obtained from dressing material and fastened at the end of a long handle is most practical. This rag is dipped into the emulsion and passed to and fro along the surface until the latter is well covered. After the wax is allowed to dry for 30 minutes, it is polished to a glassy finish with a rotating motor brush. This hard wax coating will successfully withstand the action of water.

The care of such a wax flooring chiefly consists of polishing with a brush. When rewaxing becomes necessary, all loose dirt is swept up, and the space is mopped with a wet rag using cold water. Soap is used only where the dirt has become ingrained.

Rubber flooring may be kept clean much longer by this treatment than any other, and the expense is about 50 to 80% less than was the case with previous methods.

In the home where light traffic is experienced, occasional mopping with a wet rag will serve to retain a polished surface. If small isolated spots become dull, they may be covered with the emulsion, as old and newly waxed portions will have the same appearance.

This latter feature is one of the principal advantages of the wax emulsion. In spaces where there is heavy traffic, the same results may be obtained by washing and more frequent waxing of the particular spots receiving excessive wear. Until this treatment was discovered the whole area would have required waxing as the place separately treated would have been very noticeable.

The wax emulsion should not be exposed to extreme cold before application as it then freezes and becomes valueless. The waxing is best done at room temperature, as drying would otherwise take too long. When the wax has been applied and the layer is dry, no bad effects will result from exposure to cold.

Tire Stocks

(*Continued from page* 43)

pared. Actually the April 1 reported statistics under this heading cover all the important chain store distibuters of tires and, consequently, were included in the summary 100% estimates without change.

TOTAL REPORTED STOCKS

	January 1	April 1
Number of firms	12	13
Number of stores	3,760	3,895
Casings	1,910,483	2,051,320
Inner tubes	1,709,092	1,727,609
Index Numbers		
Casings	96.0	99.6
Tubes	85.9	84.6

Acknowledgment

The support of the R. M. A., the assistance of the National Association of Independent Tire Dealers, and the cooperation and promptness of dealers, oil-company distributers, manufacturers, and other mass distributers in submitting data used in this report is gratefully acknowledged.

Origin of Horse-Power[1]

How James Watt Obtained His Formula

In James Watt's scrapbook, now in the Birmingham Reference Library, appears under the date of February, 1782, his detailed computation of horse-power, based upon the experiences of Wrigley, his millwright. At that time horses were employed to drive mill machinery, and Watt estimated that the average cart horse developed 22,000 foot pounds of work per minute. Anxious to give good value to the purchasers of his steam engine, Watt, in using the term "horse-power," increased his estimate by 50%, and thus it came about that the 33,000 foot pounds per minute formula was evolved.

[1] *Industrial Britain*, Mar., 1937, p. 15.

Pliofilm as a Packaging Material

A. B. Clunan[1]

THE recent introduction of Pliofilm, the registered trade mark name for a hydrochloride of rubber in the form of pliable transparent sheeting, to the packaging field has further broadened the sphere of application of this material, one of the newer products of rubber research. The properties of Pliofilm, a development of Goodyear Tire & Rubber Co., Inc., are such that it is particularly adaptable for packaging purposes; however, its entrance into this field was delayed because of the large demand that arose from other applications, such as raincoats, umbrellas, garment bags, and similar items. Provision for adequate production has been accomplished, and a plentiful supply for the packaging industry is now assured.

Properties

While Pliofilm is a derivative of rubber, it is decidedly different in many of its fundamental properties. However it embodies a great many of the essential elements of a serviceable and practical wrapping material. Its chief characteristic is resistance to free liquids, such as water, oil, weak acids, alkaline solutions, and various drink compositions suitable for human consumption, and, because of its dense molecular structure, it is highly moisture-vapor proof. Also, in its normal form it is odorless and tasteless. It is perfectly sanitary and is not affected by mold or insects.

Unlike most transparent sheetings, Pliofilm is moisture proof in itself and does not depend for this essential characteristic upon a minutely thin protective coating. As a result, normal handling and converting operations such as folding, creasing, laminating, printing, and heat sealing do not impair its moisture-proof quality. As it has no inherent moisture content, it does not dry out and shrink. This quality with its ability to resist moisture absorption makes for excellent dimensional stability and freedom from wrinkling and drawing. The dimensional permanence of Pliofilm is indicated by the fact that it has practically no expansion or contraction throughout a humidity range of 15 to 90% at room temperature. It does not lose moisture and become brittle when subjected to prolonged exposure in an unusually dry atmosphere; or does it have any tendency to absorb moisture when exposed to unusually damp atmosphere. Thus seepage of moisture vapor through osmotic action, quite common in most other wrapping materials, is avoided.

Because of its high tear resistance and ability to stretch, the sheeting resists puncturing, and its pliability permits it to conform readily to irregular surfaces over which it may be wrapped. The strength of Pliofilm is not materially affected by low temperatures.

When Pliofilm is heated, it becomes ductile and plastic, and, while in this condition, it can be stretched or formed to conform with any irregular contour. Also, while in this plastic state, it tends to adhere to itself, a unique characteristic which may lead to many new and unusual applications.

Characteristics and Methods of Adhesion

Pliofilm may be welded or sealed in three ways: by heat alone, by a combination of heat and solvent, or by adhesives, depending upon the processing requirements.

Thermoplastic in nature, Pliofilm seals to itself with a strong weld at temperatures of 220 to 250° F. The welded-type seal obtained prevents minute leakages which so often occur at lappings and joints of wrapped packages. By employing a solvent such as toluene, this sealing temperature can be reduced to approximately 160° F. The sealed joints can be made relatively weak or strong as desired by using the proper solvent. This capacity for sealing at a low temperature is an important factor where Pliofilm wrapped packages are to be sealed on machines with stationary sealing plates, because at 160° F. Pliofilm does not become tacky. Thus it can be passed over heated plates without danger of adhesion in much the same manner as other moisture-proof transparent films now being used in connection with wrapping machines.

Adhesives have been developed for sealing Pliofilm to itself and for bonding it to other materials, such as cardboard, chipboard, paper, wood, foil, and metals. The adhesives are composed basically of the same materials as the product itself, utilizing various solvents to obtain variations in: the degree of tackiness, time of setting, aging quality, etc. The solvents used include: high-test gasoline, toluol, water, and ethyl acetate. The solid content of these adhesives varies from 22 to 66%, depending upon the type of result to be obtained.

Varieties of Pliofilm

Normal Pliofilm, i.e., Pliofilm to which no plasticizers have been added, is odorless and tasteless. This is the grade of material usually advocated for food packaging. For certain other uses where unusual pliability is desired, plasticizers are added which, in some instances, tend to impart some odor. This grade of film is used in fields entirely outside of packaging, such as for raincoats, umbrellas, garment bags, and card-table covers.

In addition to sheeting, Pliofilm is being converted into a number of other items that can be employed for packaging, such as bags, envelopes, ribbons, binding, braid, and cord. Pliofilm is also being laminated to various grades of paper and cardboard stocks, as well as cloth, burlap, foil, silk, cotton, etc. In this way materials with widely diversified characteristics can be combined to obtain results which neither material by itself will provide.

[1] Goodyear Tire & Rubber Co., Inc., Akron, O.

Colorless, transparent sheeting is produced in five standard thicknesses ranging from 0.001- to 0.0025-inch, and several different qualities with different amounts of plasticizers. In spite of its dense structure Pliofilm is unusually light and affords an exceptionally large surface area per pound; for example, with a thickness of 0.001-inch, the area is 25,000 square inches per pound of material.

Besides the crystal clear type it is also produced in a wide variety of colors with transparent, opaque, or metallic effects. Printing of Pliofilm is in the stage of rapid development. Several companies are now equipped with presses and suitable inks to produce attractive and color-fast printed designs to suit practically any requirement. Multi-color effects by the rotogravure process of printing are readily produced on Pliofilm.

Applications

The applications of Pliofilm to packaging are numerous. It is being used in direct contact with many food and pharmaceutical items.

Tests were conducted on a wide variety of hygroscopic items or materials where resistance to either moisture absorption or loss of natural moisture content was desired. These tests showed the protective value of Pliofilm to be considerably superior to other transparent moisture-proof sheeting now available. The tests referred to were on such items as: cereals, milk powders, cakes, crackers, cookies, marshmallows, hard candies, nut bars, pharmaceuticals, cigarettes, pipe tobacco, and cigars.

There are many special applications for which Pliofilm is suited. For example, owing to its excellent dimensional stability Pliofilm makes an excellent transparent window for cartons or boxes. Moisture-proof transparent milk bottle covers is another application. It is also adaptable to use as a tamper-proof bottle cap, although this particular field has not yet been developed commercially.

Research and Development

In order to provide a complete service to customers and prospective users of Pliofilm, competent research and package development departments have been established. The research department is prepared to conduct technical tests to establish the effectiveness of any particular type of package for a specific purpose. The package development department will suggest attractive and efficient methods of application consistent with good commercial practice.

Rubber Technology Conference

(Continued from page 39)

oxide, and accelerator.

Practical suggestions are made as to the most suitable carbons to use in particular cases, with the appropriate proportions of auxiliary materials.

Brief notes are added on the possible development and implications of the theory that mono-molecular layers of zinc soap are formed on the carbon. W. B. Wiegand and J. W. Snyder, Columbian Carbon Co. and Binney & Smith Co., New York, N. Y.

Use of T-50 Test for Evaluating the Rate of Vulcanization of Carbon Gas Blacks. The need of accurate methods of evaluating the effect of gas blacks on the rate of vulcanization of rubber is emphasized. The technique of the T-50 test is described, together with various improvements in apparatus and method. Attention is drawn to the need of adhering strictly to a standardized procedure in mixing, vulcanizing, and conditioning the test samples. Tensile test results and T-50 values are given for mixings containing slow-, medium-, and fast-vulcanizing blacks, in each case using mercaptobenzthiazole and diphenylguanidine as accelerators. It is shown that the T-50 values form a more sensitive index to the state of vulcanization, and hence to the effect of the black on vulcanization, than tensile test results. Moreover the T-50 test shows less variation in day-to-day repeat tests on the same black than do the tensile modulus figures. It is concluded that the T-50 test is a rapid and accurate means for measuring the effect of carbon blacks on rate of vulcanization in production control. G. L. Roberts, United Carbon Co., Inc., Charleston, W. Va.

The KOH Number Test and Its Application to the Compounding of Zinc Oxide in Rubber Latex. The KOH number of latex is defined as the number of grams of KOH per 100 grams of rubber corresponding to the end point in the electrometric titration of latex. Details of the determination of the KOH number are described. The KOH numbers of commercial latices vary, and creamed or centrifuged latices differ from the unconcentrated types. Experiments are described which show that the amount of KOH to be added for optimum stabilization of latex mixings, containing zinc oxide, but no buffer ingredients, varies with the latex and is numerically equal to the KOH number.

With other ingredients in the mixing which take up alkali, e.g., casein, glue, acidic accelerators, such as "Captax," additional KOH is required. For casein and similar protective ingredients the additional amount can be determined by electrometric titration of the ingredients. For "Captax" the additional KOH required amounts to two-thirds of that stoichiometrically equivalent to the "Captax," and explanations of this lower value are advanced. The optimum stabilization is determined in terms of maximum mechanical stability, minimum viscosity, and minimum change of properties with time. H. F. Jordan, United States Rubber Products, Inc., General Laboratories, Passaic, N. J.

A Relationship between the Critical Oxidation Potentials and Antioxidant Activity of Rubber Antioxidants. The critical oxidation potentials E_c were determined for several compounds used as rubber antioxidants. These values of E_c together with values available for other compounds from the literature were plotted as a function of the antioxidant activity of the compounds in a tread stock. The data presented indicate that all of the compounds which exhibit marked antioxidant activity have an E_c value between 0.65-volt and 0.90-volt. Many substances exist which have an E_c value within this optimum range, but do not exhibit much antioxidant activity. The condition that the E_c value for a good antioxidant falls between 0.65-volt and 0.90-volt seems to be necessary, but not sufficient. C. M. Doede, Firestone Tire & Rubber Co., Akron, O.

Editorials

Rubber Conference Proceedings

PAPERS presented at the Rubber Technology Conference in London on May 23 to 25 are to be published in book form, and a limited edition will be available to subscribers during July. The price will be £1.11.6, or approximately $7.85 at the current rate of exchange. Those wishing to obtain copies should send their subscriptions at an early date to W. F. V. Cox, secretary, The Institution of the Rubber Industry, 12 Whitehall, London, S.W.1, England.

The existing wide international interest resulted in the presentation of 107 papers, among the authors of which were included many eminent rubber technologists. The subject matter included in this large and geographically broad representation constitutes a remarkable collection of research information and a valuable reference book.

Termination of Employment

EVEN in normal times, but particularly during depression periods, occasions arise when individuals through their own initiative or otherwise, sever business connections with an employer. It is customary and logical practice to continue along the line in which previous experience has been gained, because of personal interest and the fact that one's services should be most productive as to personal satisfaction and remuneration when doing that with which he is most familiar.

Through trade associations, technical and other societies, and personal friendships those connected with a particular industry or line of business come in frequent contact with others who are engaged in the same activities. Thus the influence of the reputation and personal relations resulting from a previous business connection may be active throughout later years.

In some instances there is a tendency on the part of one who has terminated his affiliation to assume an independent attitude toward his former associates. Quite often, in fact, a feeling of previous injustice grows into bitterness toward the company or an individual and asserts itself in a perceptible manner so as to react to the discomfort of its originator.

Frequently in instances of dismissal, management through its representative does not discuss frankly the reasons for its action. Permitting an employe to leave under a false impression decreases the possibility of a mutual understanding and fosters the growth of ill will. When ending a business affiliation, the best possible relations are desirable, and any later attempts to aggravate the situation will have a detrimental effect.

Vigilance Enhances Safety

PARTICULARLY during recent years great forward strides have been made by industrial companies in the attempt to prevent accidents through the use of guards on machines, improved lighting, elimination of slippery floors, insistence on clean and unobstructed working areas, and other physical aids to safety which tend to reduce the hazards and which are definitely the responsibility of the management and department supervisors.

Much has been written and spoken to inform the operator as to the ordinarily apparent dangers connected with his work, the type of clothes he should wear, and the proper use of suitable tools or other equipment necessary in performing his duties. In most modern organizations, special instruction and supervision have been found to pay large dividends, not only in saving lives and lessening personal suffering and inconvenience to the operator, but in preserving the trained worker for continuous production.

Carelessness by the individual has been given as the reason for many accidents, both of a minor and a serious nature. It is true that some persons appear to be inherently careless and repeatedly to inflict injury on themselves or others. They are not wilfully careless, but rather they are not giving the proper attention to their work. No job is so simple that the operator need not concentrate on the particular motion he is performing. He cannot safely work unless his eyes and thoughts are on his immediate actions. He must be continuously vigilant. Many relatively non-hazardous jobs can become hazardous if the operator's mind wanders or becomes distracted from his work. His alertness and powers of concentration must increase with the nature of the operation in regard to the exposure to accident.

If a great increase in industrial safety is to be realized, these workers must be taught to think. The task before management becomes one of human analysis. The individual must be studied, and such an appeal made to him as will create a concentrated interest in his work. This goal is not easily reached and in some cases will never be possible, but it is nevertheless the greatest factor in reducing the accident record. It is worthy of much patient effort and expense, for the result will be a safe, contented, and efficient worker who will produce a greater quantity of improved quality merchandise.

S. C. Stillwagon

EDITOR

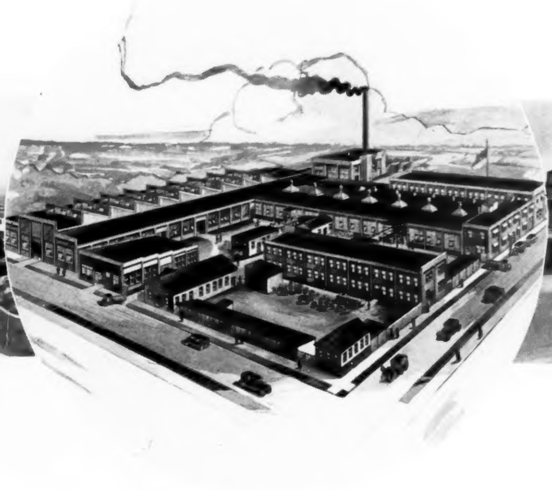
NATIONAL TIRE BUILDING EQUIPMENT

for

FORD MOTOR CO.

RECOGNITION OF NATIONAL QUALITY *and* PERFORMANCE, OF WHICH WE ARE JUSTLY PROUD

Columbiana, O., Division



Home Office and Akron Plant

Clifton, N. J., Division

NATIONAL RUBBER MACHINERY CO.

General Offices: AKRON, OHIO

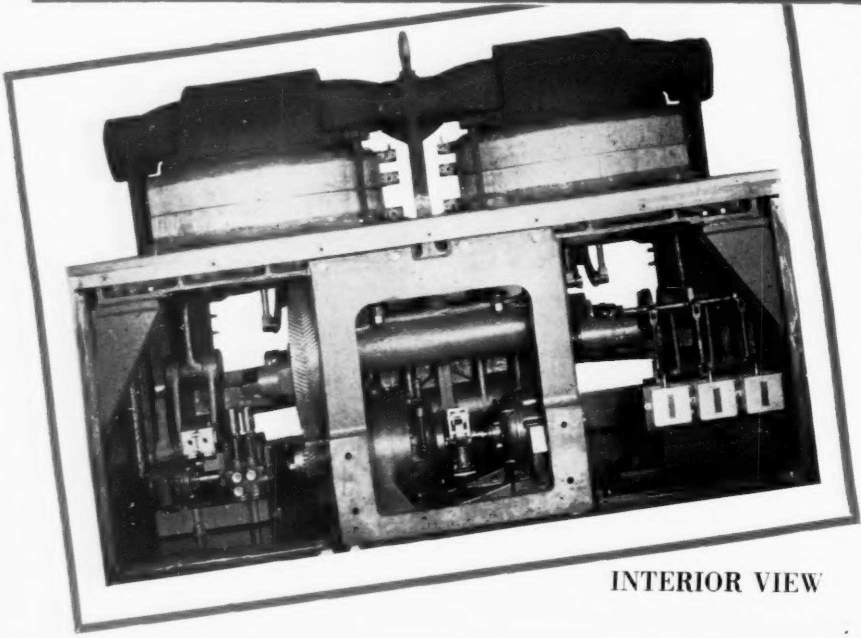
Banner Division, COLUMBIANA, OHIO
Eastern Division, CLIFTON, N. J.

David Bridge & Company, Ltd., Manchester, England
The Bawden Machine Company, Ltd., Toronto, Canada

NEW NATIONAL

DUAL TYPE TIRE VULCANIZER

FOR REGULAR PASSENGER AND AIR WHEEL SIZES



INTERIOR VIEW

Completely automatic and compact — economical to operate — equipped with new steam system for improved efficiency and exclusive with National. Machines equipped for automatic mechanical ejection of tires—an exclusive feature. All working parts enclosed but readily accessible. Molds have integral type insulation.

BUILT *for* FORD

Above—View of six rows of Model 231 tire vulcanizers — seventeen units in each row — installed in new Ford tire plant. At right—Row of vulcanizers in open position.

The New Ford Tire Plant

Ford Production Principles Applied to Tire Manufacture

Modern Engineering and the Latest Developments of the Rubber Industry Are Embodied Throughout[1]

E. V. Osberg

THE erection of the new Ford tire factory at a cost of $5,600,000 at the Rouge plant, Dearborn, Mich., is perhaps the most significant achievement in the tire industry during recent years. The plant, recently put in operation, embodies the latest in equipment design, continuity of process, and production methods. It is designed to produce 6,000 tires and 6,000 tubes daily in eight hours. Present production, pending completion of equipment installation, is approximately 4,000 tires daily; tube production will be started in the near future.

The most striking feature of the new plant is the almost complete mechanization of tire production, hitherto requiring skilled craftsmen. The continuous flow principle has been utilized, not only for handling materials, but for actual tire production itself. Throughout the plant is evidence of a well-organized plan to promote automatic continuity of production from the raw materials to the finished tire. Much credit is due E. F. Wait, plant manager, and the Ford engineers, under whose direction the new plant was designed and equipped. An indication of the simplification of manual processes may be gained from the fact that all production employes had no previous experience in tire manufacture, but were trained at the Ford factory.

In keeping with an established Ford policy, equipment and production methods have been planned to maintain at all times the utmost cleanliness. The compounding and mixing departments are spotlessly clean and, unlike those of other rubber factories, are not separated from the rest of the plant. Cleanliness and neatness have proved their worth, having led to still greater efficiency and accuracy in production.

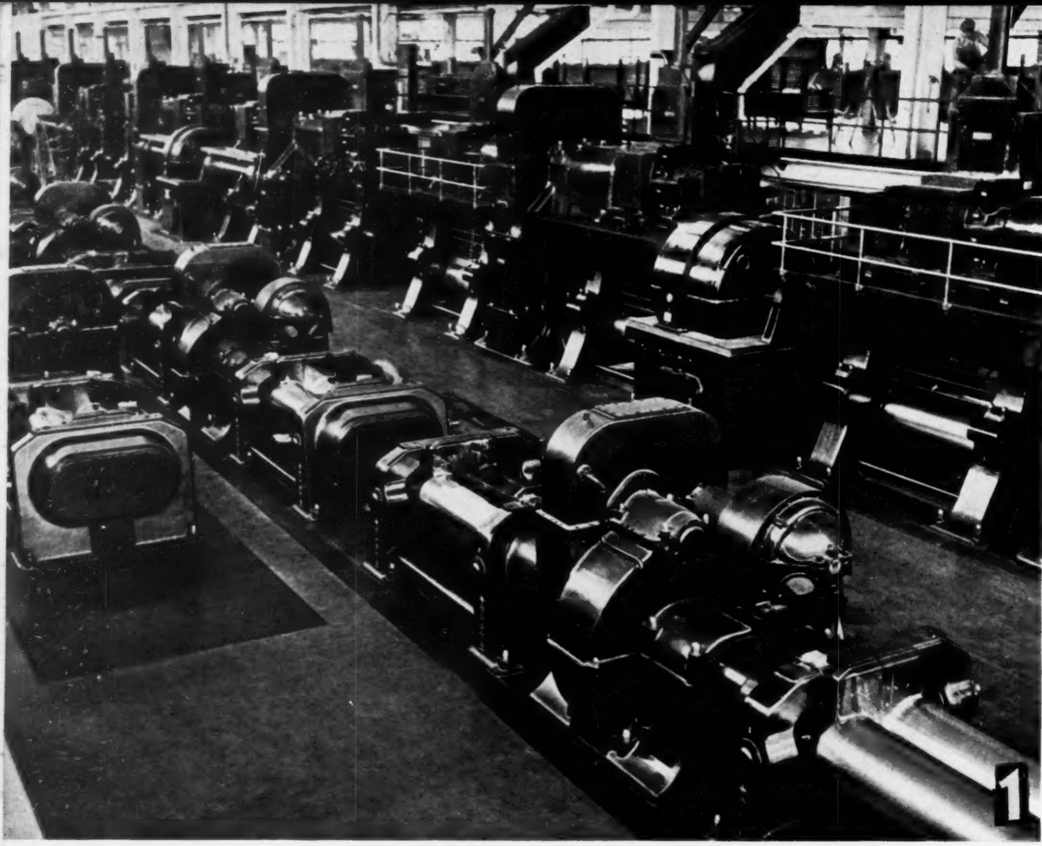
Plant Location and Layout

The new plant consisting of a single building is strategically located next to the Ford dock on the Rouge River where raw materials may be conveniently received; while on the other side of the building are railroad sidings. The brick building itself with windowed recesses in the flat roof covers 4.5 acres, is 60 feet high, and has 435,000 square feet of floor space with 70,000 square feet of window glass of a special actinic type that filters out the ultra-violet rays of the sun, thus retarding deterioration of the rubber. With this large window area the entire plant is extremely well lighted from the exterior. The framework construction of the plant is such that floor areas are exceptionally free from posts; unobstructed area in craneway is 400 by 80 feet; while many such areas are 60 by 25 feet or 60 by 50 feet. An air circulatory system which allows the windows to be closed at all times, provides fresh filtered air from the outdoors in the summer and, during the winter, heated air.

The majority of the essential processing equipment, including machinery for rubber mixing, fabric processing,

EDITORS NOTE. This article is the first published description of details relating to the Ford Motor Co.'s tire factory.

[1] All photographs through the courtesy of The Ford Motor Co.



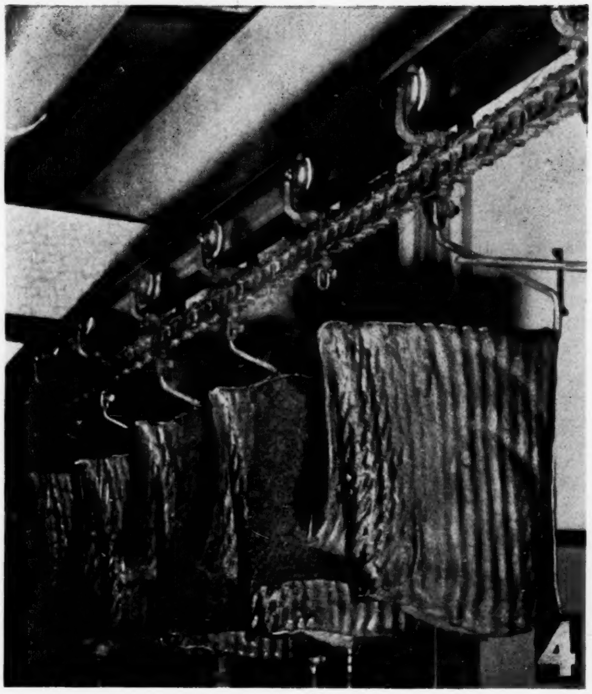
Banbury-Mixer Units and Feed Mills

Opposite View of Mill Area: *Left to Right*, Balconies, 12 Banbury-Mixer Units, and Two Feed Mill Lines

Rubber Extruding from Gordon Plasticator

and tire building and curing, is located on the spacious main floor, which is 800 feet long by 240 feet wide. Three upper balconies, 400 feet long and 40 feet wide, extend along one of the side walls of the building. On the first balcony are the Banbury control boards and plant laboratory; on the second, the weighing department; and on the third, the compound storage room. The third is closed in at the side toward the center of the building; while the lower two are open.

On the main floor and at the edge of the balconies are located the Banbury mixer and sheeting mill units, arranged in a row 300 feet long. In front of the balconies the main area is unobstructed to the roof. In this area, through which a 25-ton traveling crane operates, are the



Hook Conveyer Transferring Plasticized Rubber to Balconies

20 warming and feed mills. In progressive location toward the other side of this area and extending lengthwise of the building are the following production lines: ply fabric processing; bead, chafer, and breaker fabric processing; and tread production. Further over and along the side of the building opposite the balconies are the tire production lines, arranged from one end of the building to the other in the following order: bead building and assembling; ply stock cutting; tire building; bagging; tire vulcanizing; debagging; cleaning; inspection; and balancing. On the opposite side of the building and at the end of the balconies, tube production will take place, also on straight-line production methods.

In the basement, which has the same area as the main floor, crude rubber is stored, cut, and plasticized. Here, also, are the maintenance shops, compressors for the tire vulcanizers, fabric storage space, and central lubricating systems for the mixers and plasticators.

A 12,000 k.w. sub-station on the first floor and in the basement contains the motor-generators, transformers, and high voltage equipment. The plasticators and Banbury mixers are powered by motors operating at 13,200 volts A.C., the standard Ford power plant voltage, to eliminate losses produced by transforming to lower voltages. The feed and warm-up mills and the tire vulcanizers are operated at 440 volts A.C.; while the five calenders utilize D.C. motors at 230 volts. A refrigeration plant for supplying mill rolls with cold water is in the basement. Provisions for tire testing are being made on the first floor and the basement.

Compounding and Mixing

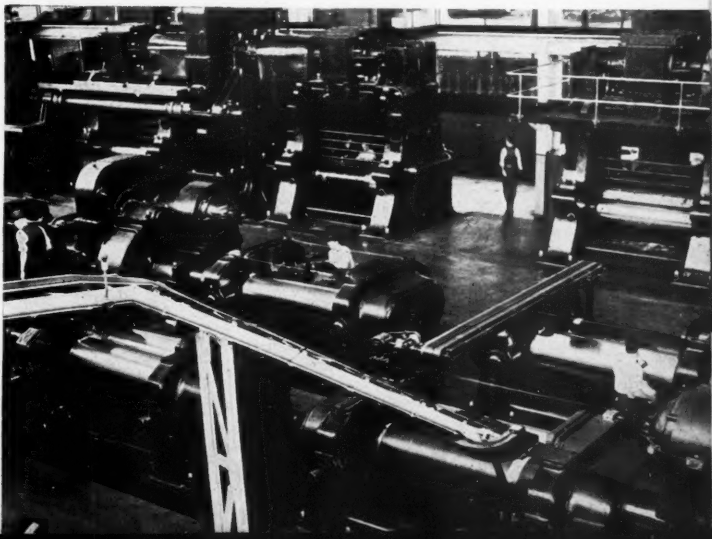
Compounding and mixing in the new factory are largely automatic; crude rubber is prepared in the basement and conveyed to the second balcony; compounding materials are stored on the third balcony and are automatically weighed on the balcony below. The 12 massive mixers, combination Banburys and sheeting mills, located on the first floor, are charged and operated by means of electrical control from the first balcony.

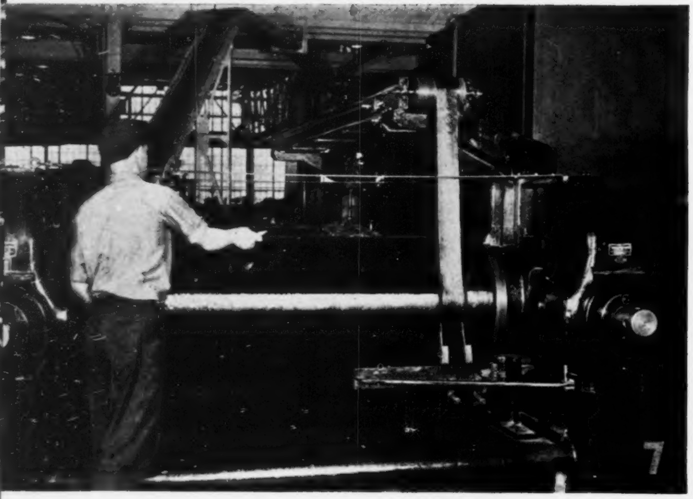
Preparation of Crude Rubber

Processing begins in the basement where the crude rubber is stored. To simplify compounding, only two grades of rubber are used: one, smoked sheet; and the other, crepe. The bales are placed on a belt conveyer where the metal bands are cut and removed by a workman; superficial impurities such as lint are removed by a blowtorch. The bales pass along to one of two Farrel-Birmingham rubber cutters of the self-contained hydraulic type. As a bale drops into the cage, a hydraulically operated plunger

Chutes from Storage Bins for Compounding Materials Used in Nos. 1 and 2 Banbury Mixers

Mill Installation with Stock Feed Conveyers; Banbury Units Are Shown in the Background





Rubber Being Warmed for Processing; Stock Knives on Front Roll Cutting Ribbon Which Is Conveyed to Feed Mill; *Background*, Secondary Stock Conveyer to Next Operation

forces the rubber through a multi-bladed knife, with the blades arranged radially so that the rubber is cut into wedge-shaped segments. Another conveyer belt picks up the cut pieces and carries them slowly through a room heated to about 200° F. This preheating, which materially aids the plasticizing, takes about 3½ to 4 hours. The rubber continues on the belt to two Gordon plasticators, each powered by a 700 h.p. synchronous motor operating on 13,200 volts and each having a capacity of approximately 9,000 pounds of preheated rubber per hour. In the Gordon machines the rubber is plasticized, and the extruded strips are cut into convenient lengths which are placed on an overhead hook conveyer and transferred to the second balcony where they are later used for compounding.

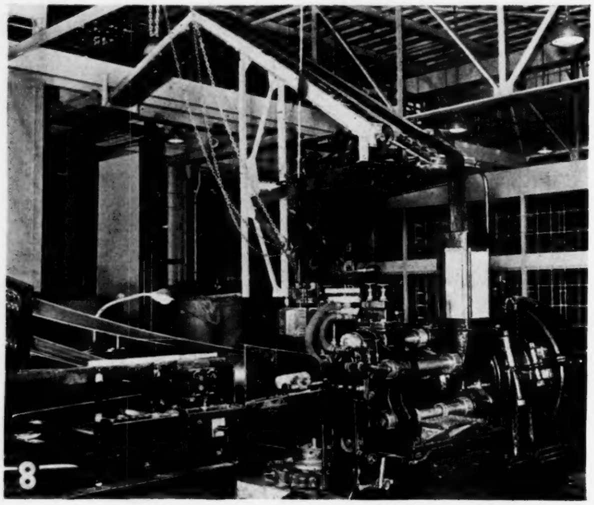
Compounding Ingredients Storage

Compounding ingredients are all stored on the third balcony. Carbon black of the easy-flow type is received at the side of the plant in tank cars equipped with bottom openings. As the black flows through a hopper and chutes to a chamber in the basement, a screw conveyer transfers it to the third balcony where it may be loaded directly into any of eight storage bins in line with electrically operated and push-button controlled openings. The softener, a thick viscous liquid, also arrives in tank cars which are provided with coils to permit heating the softener, thus reducing the viscosity sufficiently to permit transfer through pipes to a basement storage tank. This tank also has steam coils, and the softener is heated just prior to piping it to the steam-jacketed supply tank on the third balcony. To the softener in this tank is added the antioxidant in the correct proportion for compounding; the mixture is maintained in a fluid state at a temperature of 200° F.

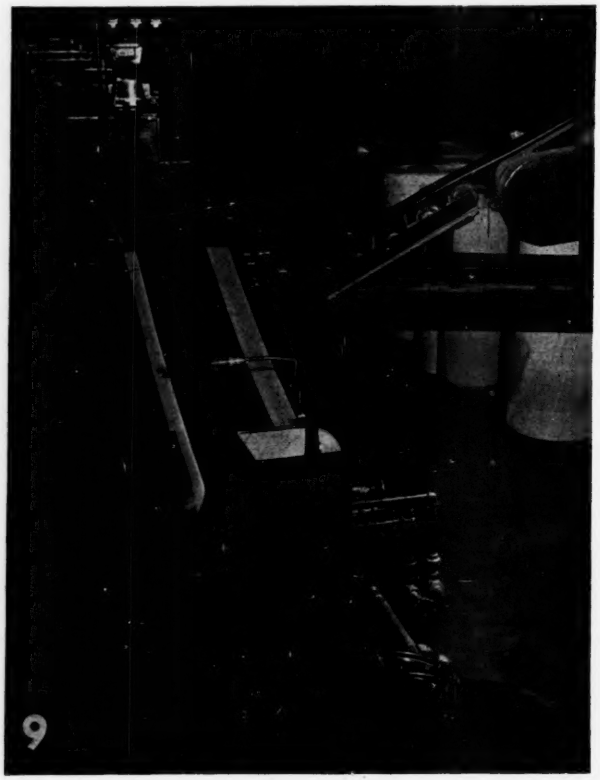
The remainder of the compounding ingredients is brought up to this balcony in an elevator, and the powders are placed in their respective storage bins. The stearic acid, in the form of cakes, is placed in a steam-heated tank on the third balcony and kept fluid at about 200° F.

Weighing

All automatic weighing, as specifically described below, is operated by the control boards located on the first balcony. For convenience, let us designate the 12 mixers numerically 1 to 12 as they are arranged and planned for use at the Ford plant. Nos. 1 and 2 are intended for mixing the bead insulation, breaker, cushion, reenforce

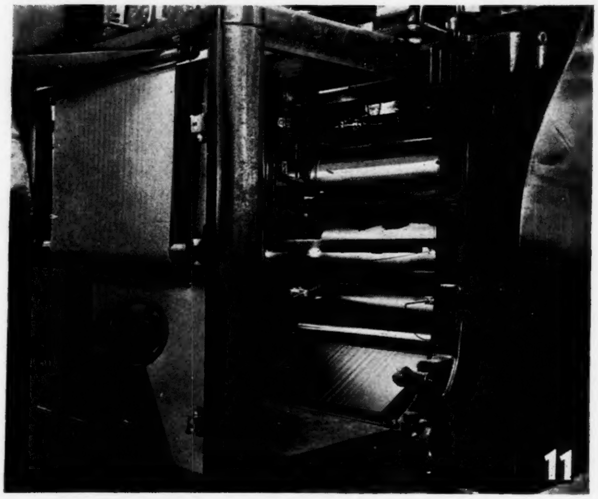


Extruder for Tread and Sidewall; Stock Is Being Fed in at the Top and Extruded on to the Conveyer Belt Shown at the Left



Tread and Sidewall Being Extruded; In the Background Are the Conveyer Scales for Checking Thickness

gums, and master batches of zinc oxide, accelerators, etc. Nos. 3 to 8 are for tread stock only, utilizing some of the master batches made in Nos. 1 and 2 mixers. Nos. 9 and 10 are set to mix stocks for the ply fabric; while Nos. 11 and 12 mix the tube master batches and stocks. For each of the 12 mixing units there are three specially designed automatic scales; these are located directly above their respective Banburys on the second balcony and are used individually for automatically weighing the carbon black, the mixture of softener and antioxidant, and the stearic acid that flow by gravity from the balcony above. After weighing, the scales discharge the materials through pipes directly to the Banbury mixing chambers. Located above and between No. 1 and No. 2 mixing units are five additional automatic scales for five other compounding ingredients. Through a clever belt conveyer unit these scales can be used for either Banbury. Each scale discharges on to a concave conveyer belt which can travel in either direction so as to service the particular Banbury to be charged. At each end these five belts in turn discharge



Coating Fabric on First Three-Roll Calender of Tandem Unit

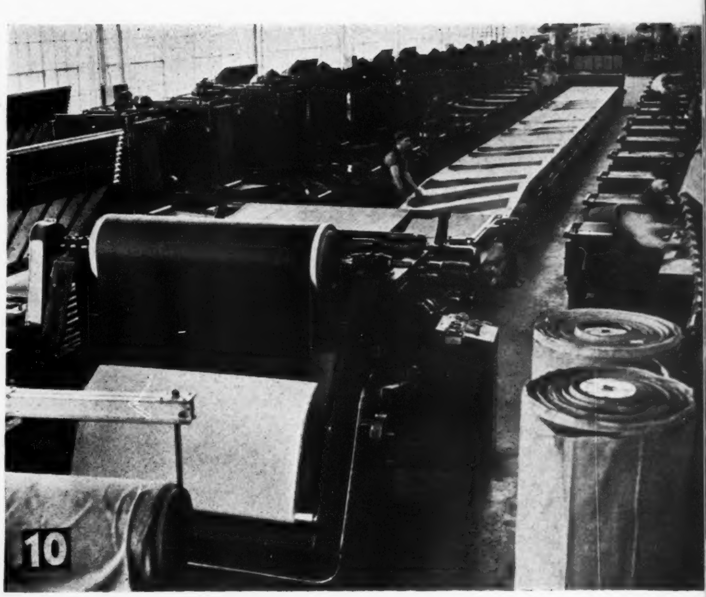
on to one of two concave belts traveling at right angles and toward their respective Banburys.

Plasticated rubber, reclaim, and master batches are the only materials weighed manually; this weighing is done on the second balcony with conventional weighing equipment. The weighed slabs are dropped through chutes (one for each Banbury) on to a conveyer belt located just beneath the floor and operated by the control board so as to travel crosswise of the balcony toward the Banbury charge door at the proper time.

In the case of highly accelerated compounds, sulphur is weighed automatically into special containers and mixed in the stock by hand on the mill below the Banbury. Otherwise it is added to the mix in the Banbury in the same manner as are other powdered ingredients.

Mixing Control

A control board for each mixer is located on the first balcony directly above the mixer. The control itself is an elaborate electrical mechanism which controls the automatic weighing, the slab-rubber feed-conveyer, and the entire mixing cycle after the operator presses a starting button.

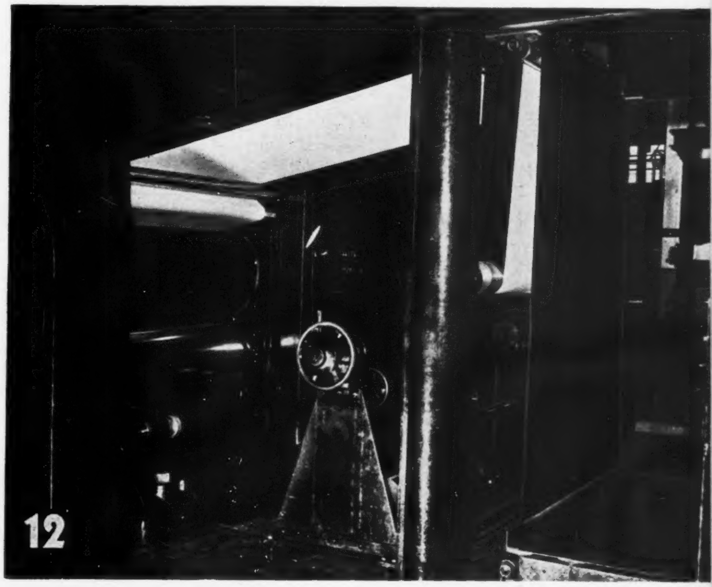


Rotary Bias Cutter for Ply Stock Discharging on to the Conveyer between Two Rows of Tire Builders

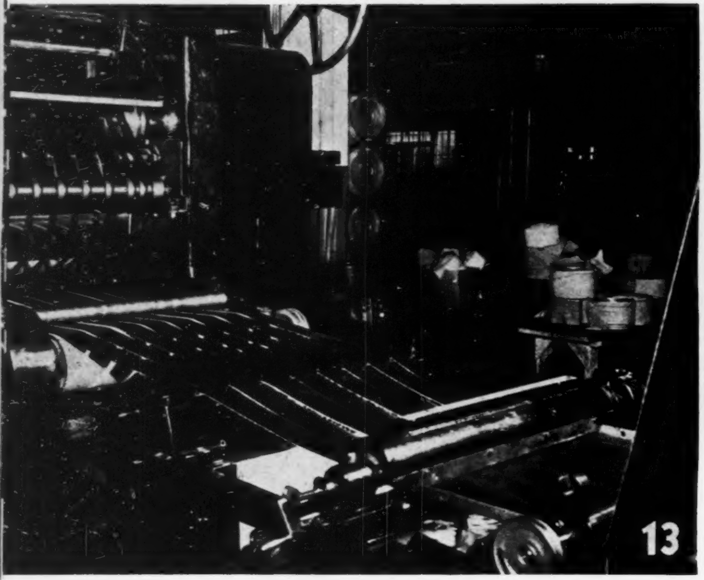
The various ingredients are fed into the Banbury at the proper time in the cycle. The cycle may be varied to produce any desired combination of time intervals for machine operation and compounding material. To alter the cycle the automatic scales for the compounding ingredients are adjusted and the dial settings on the control board are changed to give the desired time intervals. In case of the improper functioning of any part the machine shuts down automatically.

Banbury Mixer Units

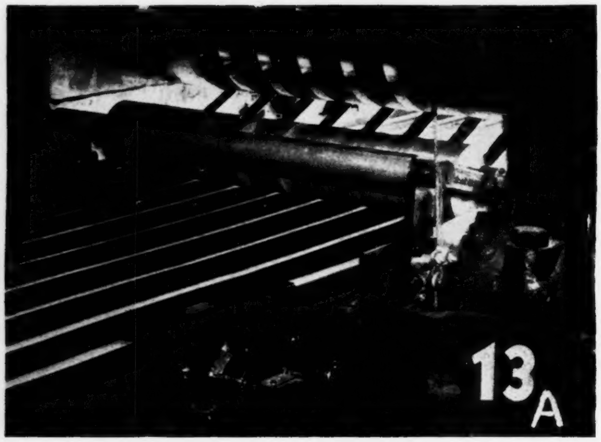
The mixing units, built by Farrel-Birmingham and



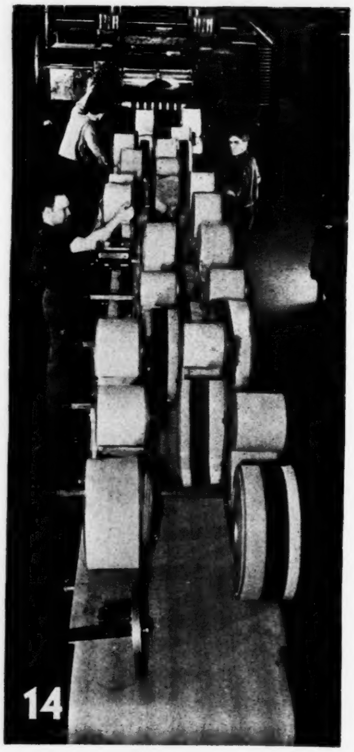
Coating Reverse Side of Fabric with Second Three-Roll Calender



Fabric Being Fed through Slitting Machine and Receiving Gum Strips beneath Specially Designed Calender

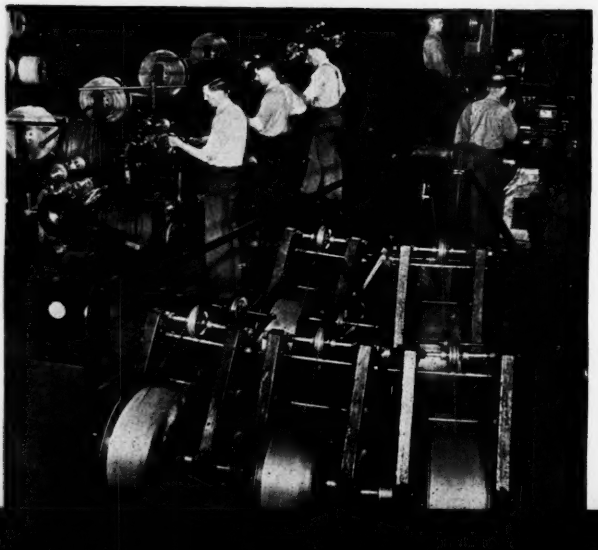


(*Above*) View Showing Gum Strips from Calendar Roll Being Placed on Strips of Fabric as They Emerge from Below the Calender; Rubber Scrap Is Returned to the Calender Bank



(*Right*) Fabric Stock Being Rolled into Liners as It Comes from Strip Calender

(*Below*) *Right*, Building Beads from Five Strands of Wire; *Left*, Bead Flippers with Operators Applying Reenforce Fabric



located on the main floor below and at the edge of the balconies where the compounding and weighing are done, are 24 feet high from the floor to the top of the charging cylinder. The battery of 12 is divided into three groups of four units each and form a row 300 feet long. Each mixing unit comprises a No. 11 Banbury built directly over and integrally with a sheeting mill so that the rubber mix drops from the discharge opening of the Banbury on to the mill rolls. These rolls are 84 inches long and 26 inches in diameter. Each mixer is capable of handling approximately 325 pounds of stock, with the usual mixing cycle requiring about 15 minutes. Each group of four Banburys and four mills is powered through two drives by a 1,250 h.p., 600 r.p.m. synchronous motor which is operated at a voltage of 13,200 volts. Each motor with double ended shaft is connected through flexible couplings of the floating-shaft type to two quadruple reduction units, each of which drives two Banbury and sheeter units. The Banbury mixers and sheeting mills have no bull gears or connecting gears; the rotors and rolls are directly connected to the reduction gears by universal joints.

Mixer Cycle

The mixing cycle for a typical tread stock, as automatically performed after the operator has pressed the starting button, consists of the following steps: (1) Banbury discharge door closes; (2) charge door opens; (3) the floating weight which forces the stock into the sphere of the rotor action is lifted; (4) conveyer belt transfers the crude rubber and master batches to the Banbury; (5) discharge door closes; (6) weight is lowered; (7) hot liquid stearic acid is added; (8) carbon black is slowly added during a period of three to four minutes; (9) the liquid softener-antioxidant mix is added; (10) Banbury discharge door opens allowing the rubber to drop to the mill rolls where it is sheeted, and then removed, sprayed for cooling with a solution that also prevents adhesion between sheets, and then is hung on racks.

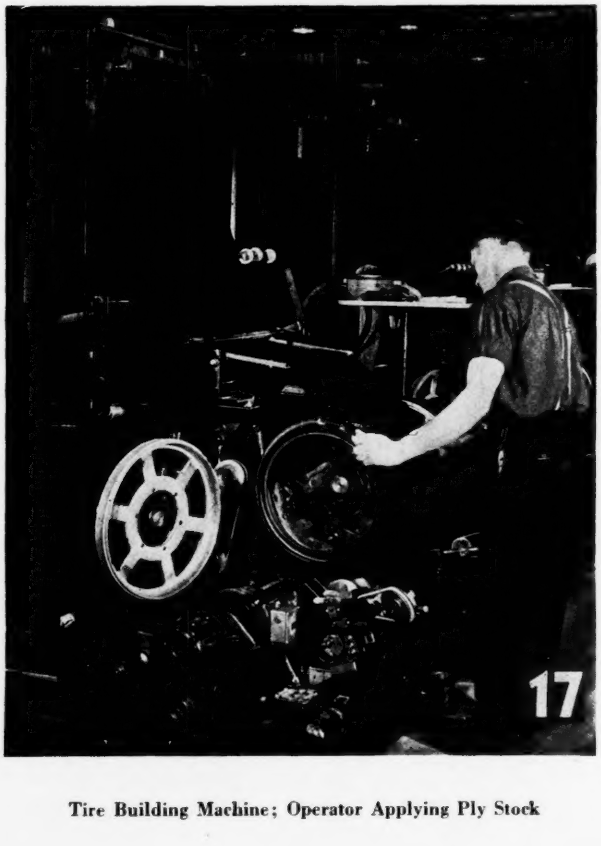
Immediately after mixing, each batch is sampled; the sample is labeled and sent by an air-operated carrier tube

General View of Tire Building Department

to the laboratory on the first balcony where it is tested before the batch is further processed.

Mixing Efficiency

Perhaps the efficient operation of compounding, weighing, and mixing can best be shown by the fact that the entire department can be handled by approximately nine men; one on the third balcony for storage; four for compounding and weighing on the second balcony; and four for Banbury operation.



Tire Building Machine; Operator Applying Ply Stock

Refrigeration, Lubrication, and Dust-Removal

In order to cope with the terrific heat generated by the friction of the rubber, particularly during the summer, the rolls of the sheeting mills and of the 20 other mills used in the next step of the process are cooled with water at 56° F. from a 1,400-ton refrigerating system in the basement.

The plasticators, mixing units, and other mills mentioned above are all lubricated by two central oil circulatory systems, each of which has a 12,000-gallon oil reservoir in the basement and provision for continuously cleaning the oil by filtration. Each system is in itself adequate to lubricate the entire installation in the case of a temporary failure of one oil system.

Cleanliness is promoted by a dust-removal system, comprising a suction pipe on the top of each Banbury which removes all floating compound dust. This withdrawal is filtered mechanically on the top balcony and, when it is chiefly carbon black, is used as such for compounding purposes.

It is apparent that the design of the compounding and mixing department has three distinct advantages: cleanliness, accuracy, and low-production costs.

Tread, Fabric, and Bead Preparation

As soon as the mixed rubber stock is checked in the laboratory, it is ready for further processing. The rubber stock is warmed up and fed from heavy-duty mills to the next operation. Both treads and fabrics are prepared by continuous straight-line production methods. Special equipment is used for bead making.

Warm-Up and Feed Mills

For warming and feed purposes, there are 20 mills with

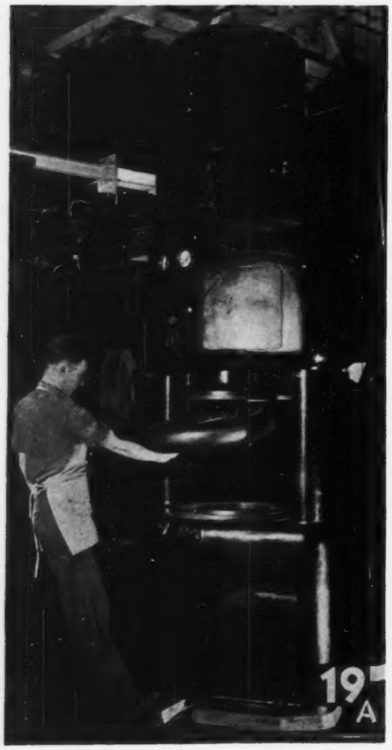
Tire Building Machine; Operator Applying Tread and Sidewall Stock

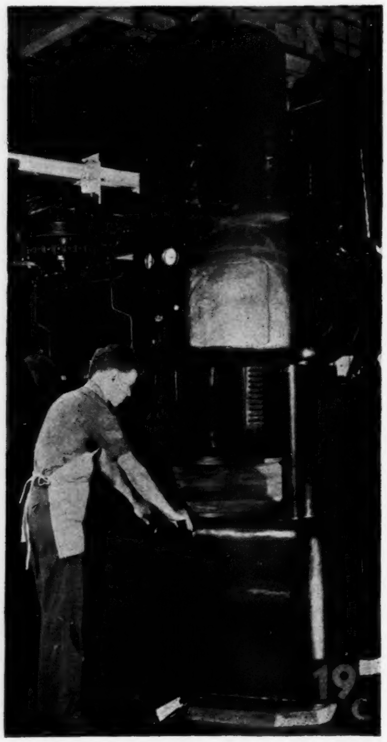
84-inch rolls located in two parallel rows of ten mills each; the rows are five feet apart. The mills in the same row are installed in units of two; each unit is powered by a 250 h.p. synchronous motor operating at 440 volts. General practice is to warm-up on one mill and then transfer the stock continuously to a feed mill in the second row, by means of ribbon stock knives and a belt conveyer. On the second mill the stock is maintained in a plastic state and is removed, as needed, either automatically and continuously or by hand as required for the next operation.

Tread and Sidewall Process

Two separate stocks for tread and sidewall are continuously removed from the feed mills and passed by belt conveyers to one of the two (a third will be installed later) combination tread and sidewall extruding machines built by National Rubber Machinery Co. Each has a capacity of 300 treads per hour. The tread stock is fed in at one end of the extruder, passing to the center portion of the flat die, while the sidewall stock, which enters at the other end, is forced to the extreme ends of the die so that both stocks meet and are extruded as an integral band with the thick tread in the middle and the sidewall stock forming the edges. The temperature at the die opening is controlled by a potentiometer to about 190° F.

The combined tread and sidewall band then passes over a roll suspended from scales which continuously weigh the stock, indicating the weight within plus or minus three ounces per tread length. Any discrepancy is indicated by a red or green light. When the tread is off gage, the operator properly adjusts the tuber to give the correct weight. Provision is being made to maintain the tread weight automatically. The extruded tread is then led 135





Bagging Machine

A—Inserting Curing Bag

B—Positioning Unshaped Tire

C—Top Platen Lowered and Tire Inflated

feet on a series of belts through a water-spray cooling chamber 45 feet in length, the tread emerging at a temperature of 75 to 100° F. An added length of belt provides further cooling in the air. The conveyer system in use is oil-gear operated; future installations will be electric.

Continuing on the belt conveyer the band of stock passes to the tread cutting machine which automatically cuts it into individual tread lengths with an accuracy of plus or minus ⅛-inch. This skive cut is at a vertical angle of 35 degrees to provide ample lapping surface when applied to the tire. The cutting mechanism consists essentially of a circular rotating blade, operating crosswise from below the stock and water-sprayed from above during operation. After the cut treads are pulled away from the blade by another conveyer belt, they are trayed on large metal racks of book-like construction and delivered to the tire building department. It is planned to transfer treads directly to the tire builders by conveyer.

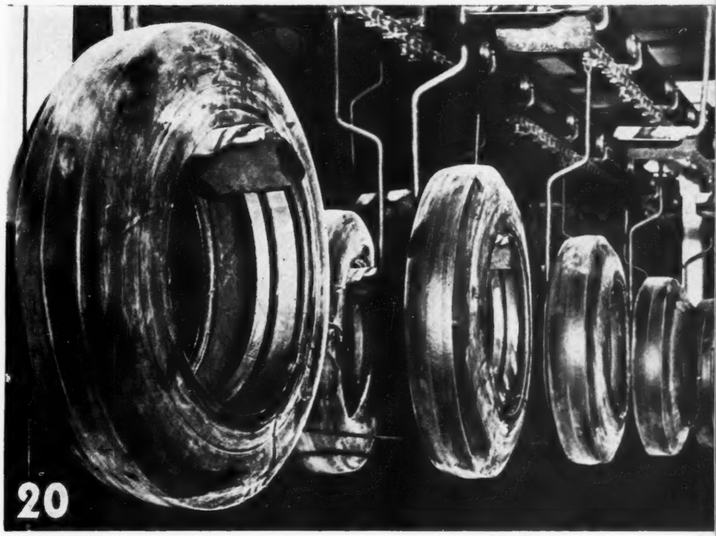
Rubberizing Fabrics for Tire Building

Four coated fabrics, ply, breaker, bead reenforce, and chafer, are used for tire making; the first two are of the cord type, and the last two, square woven. The ply or creel fabric is made at the plant directly from individual cords; while the square woven fabrics and the breaker fabric which has light filler cross-threads to hold the cords in place are purchased in rolls.

Ply Fabric Processing

On the main floor is a creel room of 3,000 spindles, from which room the cords are led through eyelet holes in a guide plate and then through a reed which spaces the cords in parallel lines forming a sheet 72 inches wide, with 1,872 cords, in which there are no cross weaves. This sheet is treated and passed into a drying unit, thermostatically controlled at approximately 250° F., in which it passes over rotating skeleton drums with internal concentric fan blades rotating in the opposite direction to accelerate drying. As the fabric leaves this drier, it passes over a compensator consisting of two rolls; one is a floating roll so as to provide a uniform tension before the next step. An 84-inch four-roll Farrel-Birmingham calender (three rolls arranged vertically and a side roll opposite the top roll) with a maximum capacity of 60 yards per minute simultaneously applies a skim coat of ply stock to each side of the fabric. The rubber is fed at the back between the bottom two rolls and down between the top two rolls; the fabric passes between the second and the third rolls. The gage of the coatings is accurately and automatically checked by continuously measuring the electrical resistance of the coated fabric. Through this arrangement it is possible to maintain the weight of the finished fabric within plus or minus ¼-ounce per yard. After the tension is again adjusted by a compensator, the coated fabric passes over six water-cooled drums, through another compensator, and is then wound between chemically treated liners into rolls of approximately 500 yards.

The rolls are delivered, as needed, to a rewinder which removes and rewinds the liner; the ply stock passes between the cylinders of a rotary bias cutter, the cutting knives of which are located spirally on the surface of one cylinder which rotates against a smooth surfaced cylinder. As the ply stock passes between the line of contact of these two cylinders, it is cut at a predetermined angle on the bias into strips 16½ inches wide. The cutter discharges on to a wide conveyer which carries the cut strips between two rows of tire builders where operators remove the strips and splice them so as to feed continuously through roller storage racks for each tire building machine.



Uncured Tires Being Conveyed from Bagging Machine to Vulcanizers

Breaker Strip, Chafer Stock, and Bead Fabric

A second fabric production line prepares the breaker strip, chafer stock, and bead fabric. As in ply production, the breaker fabric is treated and dried; while the square woven fabrics are not treated before calendering. The fabric, after compensation by floating rolls, passes through two Farrel-Birmingham 68-inch three-roll calenders having a maximum capacity of 60 yards per minute, arranged in tandem with a tension compensator between the two. On opposite sides of the fabric each calender gives the fabric a skim or friction coating, depending upon its intended use. In the case of breaker fabric both sides are given a skim coat; the rolls through which the fabric passes travel at equal speeds. Chafer and bead fabrics are frictioned on one side and given a skim coat on the other side; the frictioning is obtained by driving the rolls at different speeds. The rubberized fabrics are checked electrically for gage, compensated, passed over cooling drums, and cut on the bias in the same way as is the ply stock.

The next step is performed on a National Rubber Machinery Co. slitting machine into which the spliced bias-cut strips are guided; rotating circular knives cut the fabrics into specified narrower bias-cut widths. In continuous lengths these strips are then conveyed by a belt to two 36-inch three-roll Farrel-Birmingham calenders in tandem. These specially designed calenders have two rolls arranged vertically with a side roll opposite the top roll. Each calender is equipped with adjustable cutting knives which cut strips of rubber stock on the middle roll; the strips are transferred to the fabric as it passes beneath the calender. Thus, the upper surface of the bead fabric receives two thin gum strips: the breaker fabric, utilizing one calender only, receives one layer of cushion stock, wider than the fabric to protect the edges; the chafer strip, however, does not receive an added rubber strip and passes beneath the calenders without treatment. All the fabrics are rolled between treated liners; the breaker and chafer stock is delivered to the tire building department, and the bead reenforce fabric to the bead building department.

Bead Building

The tire bead-wire is built on a machine which is largely automatic in operation. Five strands of strong, rust-resistant wire pass in a parallel plane through the insulating head of an extruder where they are coated with rubber, forming an integral flat strip. Four turns of this strip, making 20 strands of wire in all, are automatically coiled into a circular bead the size of the automobile wheel rim. Each bead is cut off as made and placed on a Utility bead flipper that applies a cover of reenforce fabric, the extending ends of which are stitched together between rotating disks in such a way that both fabric edges point outward parallel to the bead axis.

Tire Building, Curing, and Inspection

After the essential materials have been prepared, the tires are built, shaped, cured, trimmed, inspected, and balanced. These operations follow in sequence, utilizing straight-line production methods throughout. Thus the tire is built at one end of the line, and the finished tire rolls out at the other end.

Tire Building

The tire is assembled on an individual tire building machine; the basic mechanical structure of which was built by National Rubber Machinery Co. There are 30 of these builders in two rows of 15 units, each comprising essentially: a collapsible and revolvable drum, 17 inches in diameter and controlled by a foot pedal clutch; two bead spiders, wheel-like frames for holding the beads in place before building them into the tire; a compensator framework into which the ply is fed from the conveyer at the rear of the machine. The entire tire is built by one operator in the following steps: (1) the drum is collapsed; (2) the beads are placed on the spiders at the ends of the drum; (3) the drum is expanded to its full diameter; (4) the first two plies are applied over the drum with the bias alternating; the shoulders are stitched down with rollers; (5) the beads are put in place over the edges of the ply; (6) the ply edges are turned up around the bead; (7) the third and fourth plies, also with the bias alternating, are attached; (8) the ends of these plies are turned down around the bead; (9) the two chafer strips are applied, one at each side of the tire; (10) the breaker cushion with the cushion side up is applied at the center directly over the fourth ply; (11) the combination tread and sidewall is then attached; this stock is automatically and thoroughly stitched down by means of two circular and rotating disks which press against the tire at the center and work out to the edges; and (12) the drum is collapsed, and the tire removed. The tire now resembles a small barrel with open ends and is ready, after being dusted with starch, for bagging and curing. It is understood that tire building operations are to be conveyerized.

Uncured Tire Being Placed in Vulcanizer Mold

General View of Bagging and Curing Departments; All Control Units Are Located in a Long Row as Shown at Top Right

Bagging

The next step is bagging and shaping, which is accomplished in a specially built hydraulic bagging machine in which a heavy rubber curing bag is inserted in the tire while at the same time the tire is expanded to its finished shape. The curing bag is placed on a hook in the center of the machine which pulls the bag up into a cylinder; the tire is placed in position on the lower platen; the press closes with the upper platen coming down to squeeze the tire. At the same time the bag is inserted in the tire and inflated through the bag connection, giving the tire approximately its finished shape. This operation expands the diameter of the tire considerably over its previous size. However the fabric is not stretched; the larger size is made possible by the fact that the plies were built up of strips of bias-cut fabric, with the direction of the bias alternating with each strip; hence, as the tread circumference enlarges to the required size, the cords in each layer are pulled to a position more nearly at right angles to those in the next layer.

Removing Cured Tire from Mold

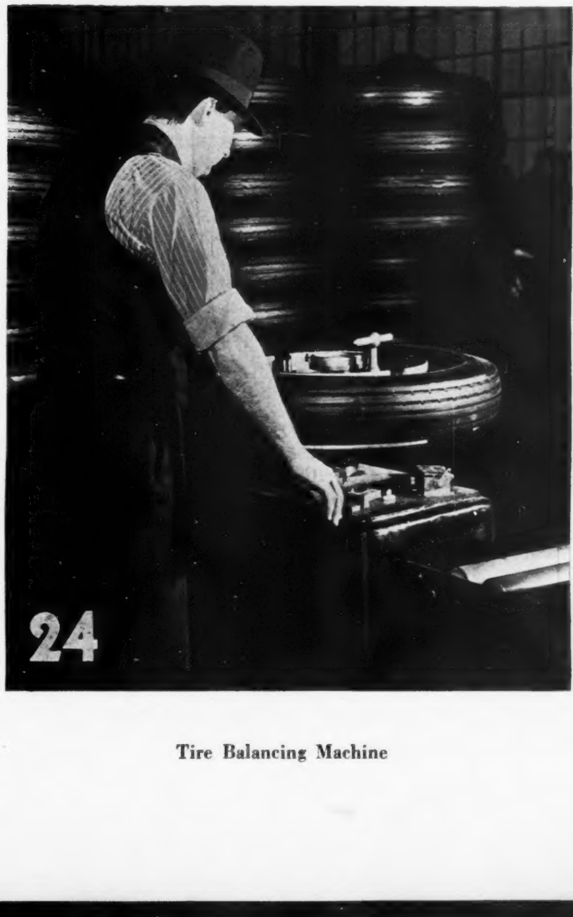
Vulcanizing

The shaped and bagged tire is hung on a conveyer hook and transferred to the curing department close at hand where there are 300 National Rubber Machinery Co. tire vulcanizers with two cavities each. These units are arranged in long rows; the outside rows are single, and the inside rows, double with the units back to back. With this arrangement one operator handles the two rows of vulcanizers facing him. In the space between double rows are the tire conveyers, a hook conveyer above for uncured tires, and a belt conveyer at floor level for cured tires.

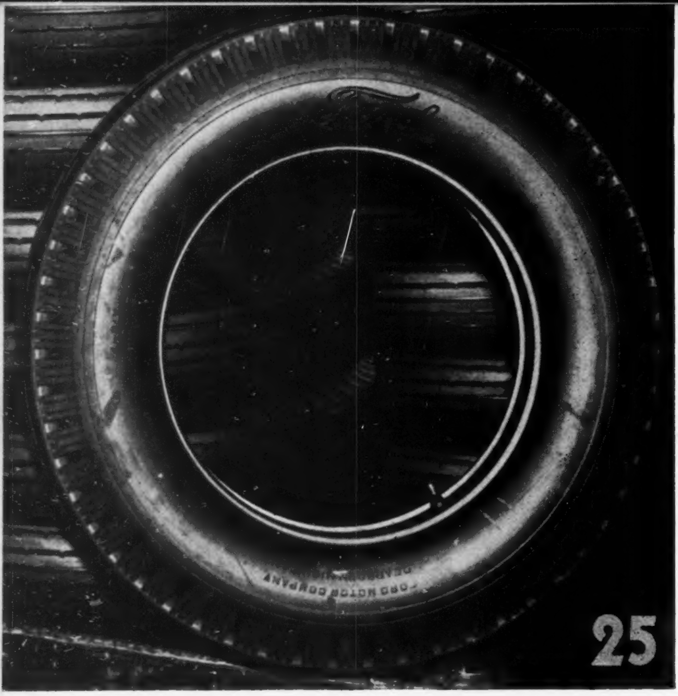
These unit vulcanizers, electrically operated and steam-jacketed, are of the latest design, and all piping and working parts with the exception of the top mold section are completely enclosed. The two top mold sections are closed by heavy cam-operated side-arms; the power is supplied by individual 3 h.p. motors operating at 440 volts. With the exception of putting the tire in place, pressing the starting buttons, and removing the cured tire, the entire curing cycle is automatically operated by individual time-cycle controllers, placed out of the way on a platform above the press. Thus full responsibility for the operation of the vulcanizers is taken over by the controller after the operator presses the button to close the press; subsequent operations such as admitting steam used in the curing bag for preliminary warming, secondary inflation of the curing bag with inert gas, relieving the gas pressure, and the final opening of the press are precisely executed according to the predetermined time schedule. Each press is equipped with a pressure-operated interlocking switch which prevents the vulcanizer from being opened while dangerous pressure exists in the curing bag.

Typical of the controller installations is the Taylor electric time-cycle instrument which times the individual operations by the opening and the closing of cam-operated mercury switches driven by a synchronous motor. Each cam is adjustable to permit any desired change in either the starting time or the duration of any operation. A change in the duration of the complete curing cycle is accomplished by changing the frequency of the electrical input to the controllers. Each instrument employs two circuits, one for driving the timing motor, the other for press operation. These two circuits are interlocked through a system of relays, thus effecting another safety measure.

To start the cure the operator places the tire in the mold and begins the curing cycle by simultaneously pressing two buttons, spaced intentionally apart so that both hands of the operator must be away from the mold; the mold closes after a brief interval, another safety precaution. The curing bag connection makes an automatic seal, through a specially designed Sinclair-Collins valve, with the pressure line which is located internally at the center of the press. Steam is passed into the bag, under 160 to 175 pounds' pressure, to heat the interior of the tire a predetermined amount, thus assuring a uniform cure. As the molds are in almost constant use, they are continuously heated at a



Tire Balancing Machine



The Ford Tire

temperature of 298° F. After about eight minutes the automatic control shuts the steam off and turns on inert gas at a pressure of 300 pounds. The pressure in the bag forces the tire to conform exactly to the mold contour, the entrapped air escaping through small vents in the mold. At the end of about 45 minutes the cure is finished, and the mold opens; a ring located beneath the bead forces the tire out of the mold. A conveyer belt upon which the cured tire is placed carries it to the debagging machine.

Use of Inert Gas in Curing Bags

Common vulcanizing practice is to follow the use of steam in the curing bag with compressed air. Under the continued influence of the oxygen present in the air and the high curing temperatures, the rubber bags deteriorate rapidly. An interesting development in this connection is the use of inert gas instead of air during the second phase of the cure. This gas, being much less destructive to the rubber, approximately doubles the life of the bag. Ford engineers have developed a plan in which they utilize the exhaust gas from four V-8 engines; the exhaust, consisting of carbon dioxide, nitrogen, carbon monoxide, and a slight trace of nitrous oxide, is purified by a scrubbing process which results in an inert mixture of nitrogen and carbon dioxide. The Ford engines used for this purpose also drive the compressors for the gas storage tanks.

Debagging

The cured tires are removed from the conveyer and placed in the debagger that automatically removes the heavy curing bags from the tire. The tire, lying flat, is conveyed to the center of the machine where it is squeezed between two plates, making it slightly out of round to spread the beads and expose a section of the bag. A ram operating from below pushes the bag out of the tire and up on to a horizontal conveyer which discharges the bag at the side of the machine; the tire passes directly through to the cleaning stand. To aid in preserving the bag, it is dipped into a mica solution before being used again.

Cleaning, Inspecting, and Balancing

As the tires come out of the debagger, they are placed on a vertical rotating wheel, brushed to remove the tiny spines formed by the mold vents, and washed with a soap solution. Trained tire inspectors then examine each tire for possible flaws, rejecting those having any imperfection.

The final step is balancing; the tire is placed on the balancing wheel and the tube inserted with the heavy part of the tube (valve location) inserted directly opposite the heavy point of the tire. The tire and tube assembly is rebalanced, and balance marks painted on the sidewall; a dot indicates the valve position, while an L indicates the light point of the tire and tube assembly. When the tire is assembled on the automobile wheel, the L is placed opposite the light point of the wheel.

Tube Production

Equipment for tube production is now being installed on the main floor. Tube processing will also be continuous and automatic; the stock will be continuously extruded in the form of a straight tube, cut in proper lengths, and cured in molds similar to those used for tires.

Plant Laboratory

The laboratory is as up-to-date in design as the plant itself. The staff comprises 12 well-trained men headed by J. H. Doering. Facilities include an analytical laboratory, physical testing laboratory, experimental mill and curing room, fabric testing room that is air conditioned to a standard humidity and temperature, office, and tire designing room. Tire testing is carried out in rooms on the first floor and basement.

Laboratory operations are divided into four divisions: factory control; analytical; compound and development; and tire testing. The factory control division supervises all stock processing and tire curing. Every batch of rubber is sampled as it comes from the Banbury mixer, labeled, sent to the laboratory by means of a tube carrier system, and tested for gravity and curing properties, the latter as judged by the hardness and tensile strength. Plasticity determinations are made frequently on stocks from the plasticators and Banburys. A plant control staff connected with this division checks instruments, processes, and end-products throughout the plant.

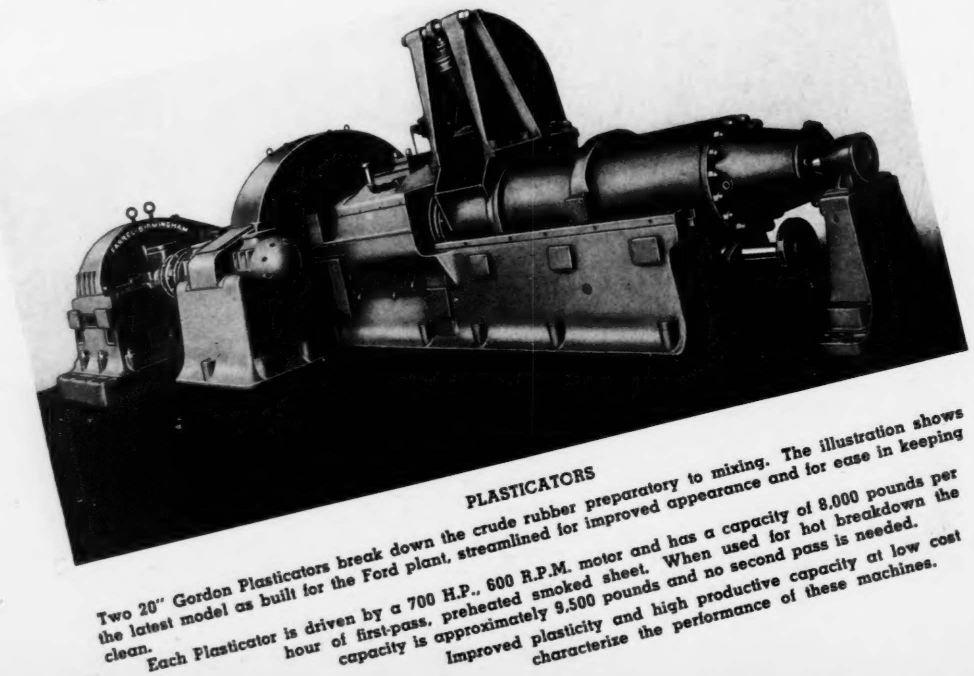
The analytical division: checks, through routine tests, all incoming materials, including fabrics; tests products; checks cures; and performs general analytical work. The compound and development division formulates stocks and investigates new materials. Special problems come within the scope of this department. The tire testing division conducts laboratory and road tests on finished tires and tubes.

BANBURY AND SHEETING MILL UNITS

Twelve of these Banbury Mixer and Sheeting Mill units mix and sheet all the stock in the new Ford tire plant. Each unit consists of a No. 11 Banbury mounted directly over a 26" x 84" Mill, making a self-contained mixing and sheeting unit capable of producing a high volume of mixed stock of consistently uniform quality at minimum cost of production.

Each group of four Banburys and Sheeters is driven by a 1250 H.P., 600 R.P.M. synchronous motor through two quadruple reduction units. All reduction and connecting gearing is included in the drive case and is connected to the rotors and rolls by universal couplings. There are no gears on the Banburys and Mills. The design provides a simplified mechanical structure of great strength and rigidity.

The illustration at the top shows the complete line of twelve Banburys and Sheeting Mills with the six quadruple drives and three motors. At the left is a close-up view of one of the Banbury and Mill units and drive.



PLASTICATORS

Two 20" Gordon Plasticators break down the crude rubber preparatory to mixing. The illustration shows the latest model as built for the Ford plant, streamlined for improved appearance and for ease in keeping clean.

Each Plasticator is driven by a 700 H.P., 600 R.P.M. motor and has a capacity of 8,000 pounds per hour of first-pass, preheated smoked sheet. When used for hot breakdown the capacity is approximately 9,500 pounds and no second pass is needed.

Improved plasticity and high productive capacity at low cost characterize the performance of these machines.

CALENDERS

The [illegible] Calender shown on this page [illegible] designed to occupy minimum [illegible] space and to permit [illegible] accessibility [illegible]. This is accomplished [illegible] contained [illegible] the driving unit and motor [illegible] on top of the Calender [illegible] in the base.

The Calender illustrated at the top is a 28" x 84" four-roll [illegible] Calender with three rolls arranged vertically and a side roll opposite the top roll. It is driven by a [illegible] H.P. variable-speed, direct-current motor, [illegible]/1000 R.P.M. The drive is on [illegible] part of the Calender, the [illegible] and motor being mounted [illegible] on top of the [illegible] part [illegible] part [illegible] and [illegible] serv[illegible] room for the [illegible]

In [illegible] three [illegible] Calen[illegible] [illegible]

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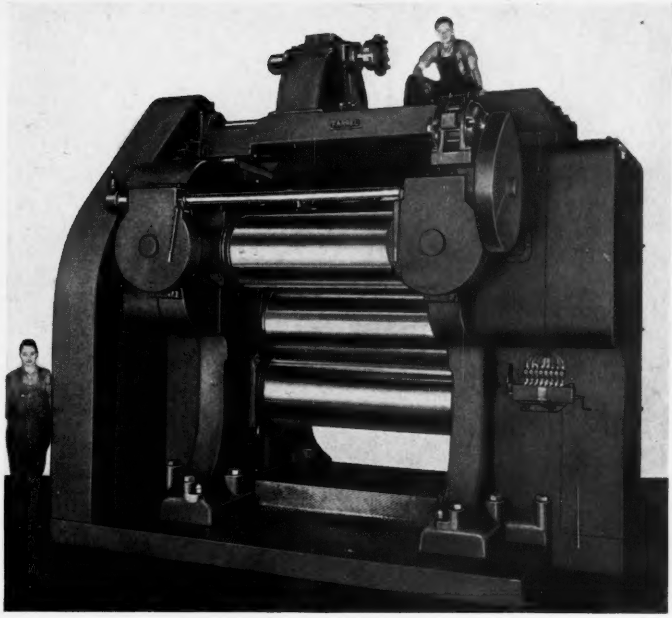
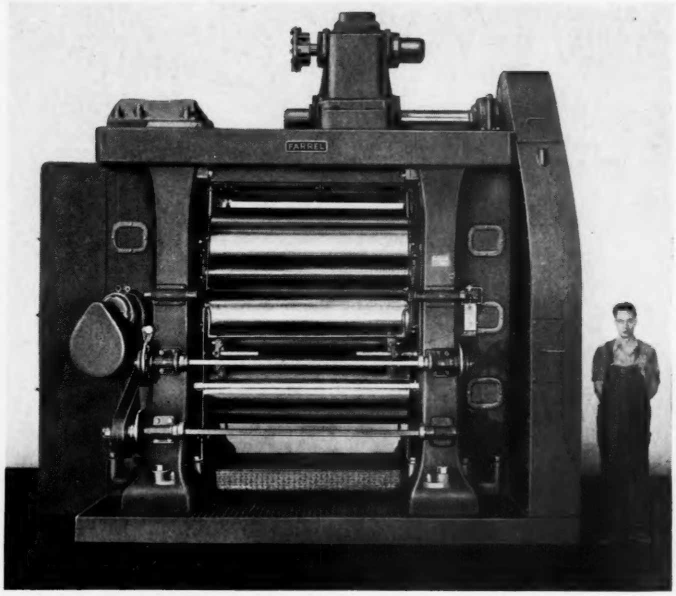
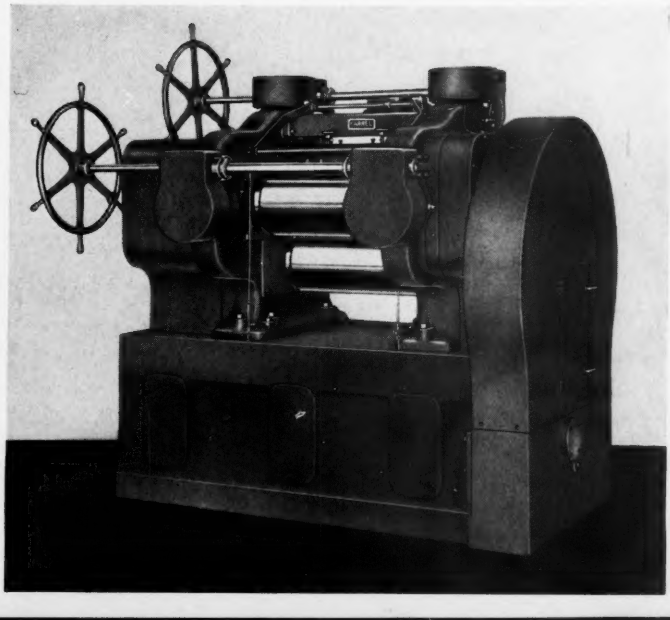
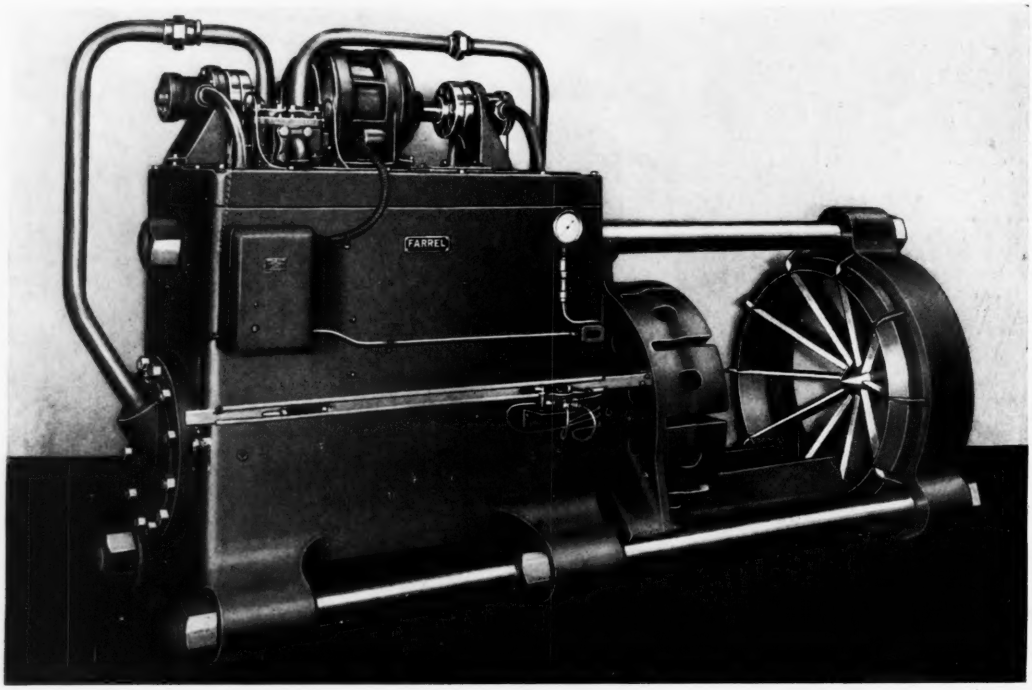






DUPLEX DRIVES

Ten of these Farrel Duplex Drives drive twenty 84" Warming and Feeding Mills in groups of two. This design eliminates all gears on the Mill. The driving and connecting gears are included in the case with the reduction gearing and connection to the rolls is by means of universal couplings. The power transmitted is 250 H.P., with a speed reduction from 900 R.P.M. of the motor to 18 R.P.M. of the back roll.



RUBBER BALE CUTTERS

Two Rubber Bale Cutters perform the first operation in the processing of the crude rubber to be made into Ford tires. The bales are forced by hydraulic pressure through the radial knives and are cut into wedge-shaped segments of a convenient size for subsequent use. The Bale Cutter is entirely self-contained, with the motor-driven oil pump mounted on the housing which contains the hydraulic cylinder and oil tank. These machines are designed to cut all kinds of baled rubber with efficiency and economy and are ruggedly constructed for severe service in continuous operation.

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What the Rubber Chemists Are Doing

A. C. S. Rubber Division Activities

Chicago Group

THE Chicago Group, Rubber Division, A.C.S., closed the 1937-38 season with its meeting on April 29, at the Hotel Sherman, Chicago, Ill. One hundred and twenty-five members and guests enjoyed the dinner and floor show presentation, which featured "Snow White and the Seven Dwarfs." The entire program was arranged by Acting Chairman O. J. Urech, of Samuel J. Bingham's Son Mfg. Co.

Dr. William G. Nelson, divisional manager, Product Quality Department, United States Rubber Products, Inc., Detroit, Mich., presented an illustrated talk on "Physical Testing of Rubber Compounds." The various equipment for testing both cured and uncured rubber compounds were described in detail. Dr. Nelson stressed particularly the methods of testing finished rubber products, such as engine supports and vibration dampers. Following the address was a lengthy discussion concerning the method of evaluating results obtained in physical testing and the use of the new types of hardness tester.

A short motion picture, "North Woods," describing the fishing and other recreational places in northern Wisconsin, was presented by J. Pattison, of the Chicago and North Western Railway Co. At the meeting, plans were discussed for a summer outing.

Los Angeles Group

THE last meeting of the 1937-38 season, held on May 3 at the Hotel Mayfair, Los Angeles, Calif. by the Los Angeles Group, Rubber Division, A.C.S., was in the form of an "Aviation Night" and was attended by 107 members and guests.

In a talk on "Rubber in Aviation," H. H. Bruderlin, of the Douglas Aircraft Co., outlined the many applications of rubber in airplanes for such purposes as tail skid cords, mountings for instrument panels and radios, frames for doors and windows, de-icers, floor mountings and coverings, and cabin walls. The speaker stated that 20 to 25 pounds of rubber per ship were used in the form of a cement for water-tightening the fuselage. Future plans call for rubber seat cushions and mattresses. Mr. Bruderlin's talk was supplemented by a colored motion picture, "Go-Douglas," showing construction details of Douglas' new plane, "DC-4."

K. J. Kernochan, manager of aeronautical sales, Goodyear Tire & Rubber Co., next spoke on "Power Brakes, Tires, and Other Rubber Products Used in the Aviation Industry." A very interesting exposition of the ideas back of the Goodyear Air-Wheel tires and hubs was given, explaining the desirability of low-pressure tires for airplane use.

Arthur Beggs, Pacific Coast sales manager of the American Airlines, commented on air transportation for passengers and mail. Chief Pilot Ed Bowe related experiences in handling the regular run of a transport ship. The work and qualifications of an airline hostess was discussed by Miss Jacklin Zinn, chief stewardess with American Airlines. H. W. Peterson, of the Pan-American Airways, spoke briefly on the future of intercontinental air transportation.

The door prize, a complete poker set, and the raffle prize, a thermos jug set, were both donated by the Godfrey L. Cabot Co., through the courtesy of the B. E. Dougherty Co. The former was won by Klaus Von Der Reith, while the beverage set was won by E. L. Royal. Table favors, automatic pencils, were contributed by H. M. Royal Co.

Boston Group

WITH 115 members and guests in attendance, the Boston Group, Rubber Division, A.C.S., held its spring meeting at the Fox and Hounds Club, in Boston, Mass., on May 6. The group's annual outing will be held on August 19, according to an announcebent by James C. Walton, chairman of the Outing Committee. Details as to the activities and location will be announced later.

CURTIS REVIEWS COMPOUNDING PROGRESS

In a talk on "Twenty-Five Years of Compounding," E. B. Curtis, of R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y., reviewed progress in rubber compounding from the comparatively simple formulae of pre-war days to the complex compounds of today. Although the compounds were simple, manufacturers guarded their formulae with the greatest secrecy and in some cases used unrelated sketches to represent the ingredients. According to the speaker, the principle compounding ingredients in use 25 years ago were: pigments—clay, zinc oxide, barytes, lithopone, and whiting; colors—ultramarine blue, chrome green, red iron oxide, and antimony sulphide; softeners—coal tar, pine tar, petrolatum, mineral rubber, and rosin; accelerators (largely of the inorganic type) litharge, magnesium oxide and lime. Reclaim was made chiefly from boots and shoes; tire, tube, and mechanical grades were developed a little later. Today there are available a wide variety of reclaims, greatly improved in quality over those available 25 years ago.

Organic Accelerator Development

Aniline oil was the first organic accelerator extensively used, but had the disadvantage of volatilizing to give off toxic vapors. Thiocarbonilide, less volatile, was next developed. This was followed by hexamethylene tetramine which was suitable for white and colored stock but caused a skin rash.

Guanidines (DPG and TPG) were next developed. TPG, slow curing and mild, was suited for thick articles such as solid tires; while DPG, decidedly more active, tended to cause scorching.

The next group of accelerators, developed by Dr. Sidney Cadwell, were the aldehyde-amines. In this class were accelerators ranging from mild to extremely active; all gave good aging stocks and were widely used for a number of years.

The thiazoles were the next important group, and today, according to Mr. Curtis, they are the most popular and widely used accelerators throughout the world. Excellent aging and suitability for white and colored stocks are the main characteristics of this group.

In addition to the main accelerator groups there are a number of special types: thiurams, certain salts and esters of dithiocarbamic acid, some xanthotes etc. Over 50 accelerators are listed by rubber journals, and there are probably some 20 more in use.

Antioxidants

Noting the exceptional aging qualities of stocks accelerated with ethyledine aniline, Dr. Cadwell experimented with this material until he obtained an excellent antioxidant, without accelerating properties. At about the same time (1923), aldol-alpha-naphthylamine was developed by Goodrich chemists.

Next antioxidants to gain prominence were phenyl alpha and beta naphthylamines. These were followed by the Ketone-amines, probably the most widely used antioxidants of today.

Other Developments

After discussing the aging tests and equipment for these tests, Mr. Curtis enumerated what he considered to be the most important developments in compounding during the past two and one-half decades.

Mr. Curtis said that much credit belongs to the research chemists for the development of accelerators and antioxidants. Also, the companies making these materials available to the industry as a whole, rather than retaining them for their own use, deserve the regard of other rubber companies.

The speaker stressed the need of a reclaim that is 60% as good as crude rubber. Although the Rubber Growers Association will spend $1,000,000 for improvement in crude, Mr. Curtis does not believe the quality will be appreciably altered during the next 25 years, and he would much rather see this sum being spent for the improvement of reclaim.

OTHER SPEAKER

L. C. Bickford, editor-in-chief of the Yankee and Colonial Network News Service, spoke on "Corrupt Government in Massachusetts."

Door prizes, made possible by contributions from rubber trade salesmen, were a coffee percolator tray set and a men's wrist watch and were won respectively, by Mr. Devore, Boston Woven Hose & Rubber Co., and Mr. Ingram, Meade Rubber Co.

Program for N. Y. Group Outing

THE annual outing of the New York Group, Rubber Division, A. C. S., will be held, rain or shine, Saturday, June 11, at Karatsonyi's Hotel, Glenwood Landing, Long Island, N. Y. To promote individual participation and make the outing of interest to the greatest number, the Outing Committee, according to Charles R. Haynes, chairman, has modified the usual program by adding events that will contribute more to the spirit of fun and curtail somewhat the keen competition among experts only. Thus, the soft ball tournament among company teams has been eliminated, with pick-up team substituted; a number of novelty events have been added; swimming facilities will be available; and the golf tournament will be held at the celebrated Engineers Golf Club within one-half mile of the outing grounds.

Program

The events for the day have been scheduled as follows: morning—registration from 9 a. m.; golf at Engineers Golf Club; soft ball pick-up games; noon—luncheon served at 12:30; afternoon—soft ball games, married vs. single men and peddlers vs. chemists; fat men's race; flyweight's race; tug-of-war; boccie; three-legged race; backward race; baseball throwing; horseshoe pitching; sack race; 6 p. m.—chicken dinner.

Arrangements for the outing have been handled by Mr. Haynes, assisted by C. A. Bartle and P. P. Pinto.

In charge of all activities will be D. C. McRoberts, who has been chosen as master of ceremonies. Those in charge of individual activities are as follows: races—W. O. Hamister, T. F. Callahan, and M. R. Buffington; horseshoe pitching—W. F. Lamela; boccie—J. Carroll; golf—H. B. McCreary; tug-of-war—B. B. Wilson and J. M. Ball; soft ball—Harry Bimmerman and S. C. Stillwagon; tickets—Peter P. Pinto and Peter P. Murawski.

How to Reach Glenwood Landing

Glenwood Landing is 22 miles from the City of New York and on the north shore of Long Island. The best automobile route is via the Grand Central Parkway, which becomes Northern State Parkway beyond the city limits. This parkway may be reached from upper Manhattan and the Bronx by the Tri-Boro Bridge; from Brooklyn via the Interborough Parkway. When on the Grand Central Parkway, continue to the end; turn left on Guinea Road; after crossing Route 25A, continue straight ahead, bearing left and then right under a railroad trestle; at next traffic light turn left to the shore and then right to Karatsonyi's. Three ferries may be used to reach Long Island: from Clason Point, Bronx, to College Point, L. I.; from New Rochelle to Port Washington, L. I.; and from Stamford, Conn., to Oyster Bay, L. I.

Trains leave Pennsylvania Station, N. Y., for Glen Head (station for Glenwood Landing) at: 9:02 a. m., 11:42 a. m., and 12:37 p. m. (all D.S.T.). Taxi from Glen Head to Karatsonyi's, 25¢.

All reservations must be in advance; tickets for members are $3.00; for non-members, $4.00. Reservations may be made by addressing Peter P. Pinto, *The Rubber Age*, 250 W. 57th St., New York, N. Y. Further details regarding the outing may be obtained from the Outing Committee chairman, Charles R. Haynes, Binney & Smith Co., 41 E. 42nd St., New York.

Akron Group Outing

THE summer outing of the Akron Group, Rubber Division, A. C. S., will be held at the Silver Lake Country Club on June 17. Golf is to be the feature of the day, and the committee has arranged for prizes for a number of events. Dinner will be served in the evening. Based on last year's experience when an overflow crowd of over 300 attended the outing, the committee anticipates a definite success for this year's affair.

North Jersey Section

THE North Jersey Section, A. C. S., recently held its election of officers, with the following results, according to the Tellers' Committee consisting of F. W. Zons, chairman, J. H. Ingmanson, and R. G. Sloane: chairman, R. H. Gerke; chairman-elect, R. J. Moore; secretary, Henry J. Wing; treasurer, H. E. Riley; councilors, R. G. Dunning, H. T. Bonnett, H. G. Walker, E. R. Hanson, H. F. Jordan, E. B. Peck, C. G. Derick, Carleton Ellis, R. H. Kienle, H. E. Eastlack, and R. W. McLachlan (the present chairman, M. L. Crossley, will serve as the twelfth councilor); alternates, Mr. Ingmanson, W. Rieman, III, and R. L. Sebastian. Chairman, secretary, and treasurer assume office July 1, 1938, and the councilors, January 1, 1939.

A.S.T.M. to Meet at Atlantic City

IN THE seventeen formal sessions of the forty-first annual meeting of the American Society for Testing Materials to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 27 to July 1, inclusive, there will be presented 47 technical papers, none of which are directly related to rubber. Committees reporting at the meeting will include: Committee D-9 on Electrical Insulating Materials; Committee D-11 on Rubber Products; and Committee D-13 on Textile Materials.

Test methods and specifications to be considered by Committee D-11 will include those for: flat rubber belting; friction and rubber tape; rubber hose; and insulated wire and cable. Revisions will also be presented for general test requirements for rubber products. Committee D-13 will present revisions of test methods and tolerances for cotton goods for rubber and pyroxylin coating. Extensive changes in the standard methods of testing and tolerances for tire cord will also be recommended. Committee D-9 will concern itself chiefly with non-rubber materials.

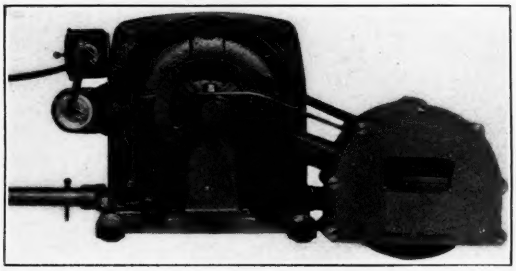
Vistanex—New Hydrocarbons

VISTANEX is the name given to a series of high molecular weight hydrocarbon polymers, sold by Advance Solvents & Chemical Corp., 245 Fifth Ave., New York, N. Y. Originally produced in Germany, where it is known as "Oppanol," Vistanex consists essentially of linear polymers with a negligible degree of unsaturation. Thus, unlike rubber, it does not readily combine with sulphur or does it oxidize easily.

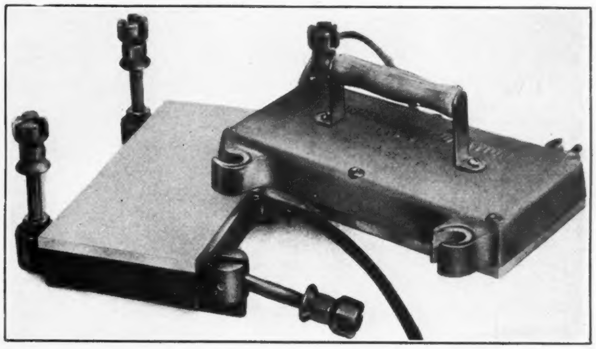
There are four grades available, which vary from a soft, viscous, sticky product to a tough, dry, elastic material, the consistency depending

(*Continued on page* 82)

New Machines and Appliances



Spadone Mold Cleaner



Portable Belt Vulcanizer

Mold Cleaning Machine

MOLDS and corrugated plates are cleaned by a new machine, designed to operate within the press opening. This feature elminates the necessity of removing the plates from the press.

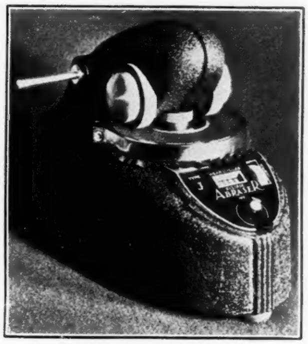
The one h.p. motor and members supporting the wire buffing wheel are mounted on a bed plate fitted with flanged wheels which track in the plate corrugations, thus assuring straight-line travel. Adjustable spring pressure holds the buffing wheel against the plate with the proper tension. As the arm supporting the wire wheel is reversible, all sections of the plate may be reached for cleaning.

In operation, the cleaner is pulled back and forth the entire length of the press by means of ropes. It is claimed that the new machine will not scratch or mar the plates. Entirely self-contained, the cleaner weighs 110 pounds, is 19¼ inches long, 19¼ inches wide, and 10¾ inches high. The buffing wheel, diven by a V-belt, is six inches in diameter with a 2¾-inch face. To meet unusual conditions, these dimensions can be altered. Spadone Machine Co., Inc.

Abraser for Flexible Materials

A SMALL portable abrasion machine provides a means for measuring the wear resistance of flexible materials such as rubber sheeting and rubberized or coated fabrics. The mechanism consists mainly of a power driven specimen holder, a reset counter, and two ball-bearing pivoted pendulum arms on which are mounted wheels made of a special resilient abrasive composition. These wheels are offset relative to the center of the specimen holder, thus resulting in a criss-cross abrading action.

To perform a test a circular specimen is cut from the sample material, and a small locating hole is made in the center. After the specimen is clamped to the abraser table with a thumb nut and washer, the pivoted wear heads are gently lowered, the counter reset, and the motor started. The test is completed, as recorded by the counter, when the abraser has produced sufficient wear to expose the fabric backing or when the serviceability or appearance has been seriously impaired.



Portable Abraser

The instrument weighs approximately 30 pounds and is six inches wide, eight inches high, and 10½ inches long. Taber Instrument Co.

Belt Splicing Vulcanizer

RUBBER or fabric belts are conveniently spliced by means of a portable vulcanizer made of light aluminum alloy. Both the upper and the lower platens are heated, using either A. C. or D. C.; the temperature of the platens is thermostatically controlled. The carrying handle may also be used for suspending the vulcanizer from overhead, permitting it to be used on belts which are in place on machines.

To operate, the upper platen is swung edgewise off from the lower platen; a single permanent bolt acts as the axis. The lapped ends of the belt, with the cement applied, are laid on the lower platen. The upper platen is then swung back into position, and the clamping pressure applied through four nuts.

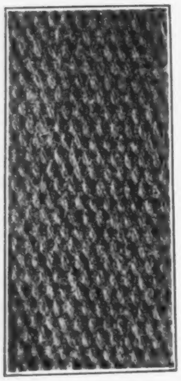
The dimensions of the platens are seven inches wide by 14 inches long; the respective distances between bolts are 7½ inches and 10½ inches. Thus a belt seven inches wide or less and having laps up to 14 inches in length can be cured in one operation by placing it in the vulcanizer lengthwise. Belts from seven to ten inches in width must be placed across the narrower part of the vulcanizer and therefore may require more than one operation, depending upon the length of the lap. Ton-Tex Corp.

Pipe Connections to Vibrating Machines

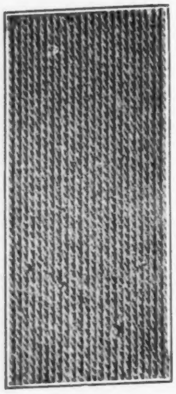
VIBRATING rubber machinery often causes trouble in several ways. One of the most serious is broken pipe and other connections due entirely to the vibrations. In these instances the vibration of the machinery is sufficient to cause crystallization in the metal, and as a result, early fracture occurs at the point of connection.

It has been found that breakages of this kind most commonly occur in connections that are made "too high." The solution that has been found best is to bring the pipe or part to be connected down to a position near the foundation and make the connection there. The explanation is that the amplitude of vibration is always best at the foundation and greatest in the parts of the machine most remote from the foundation. Thus, for instance, the top of an electric motor or compressor "moves" farther, as it vibrates, than does the base.

New Goods and Specialties



Woven Fabric for Ordinary Belting



Weftless Ply for New Belting

Cord Belting

A NEW heavy-duty conveyer belting of cord construction has been developed for use where ordinary belting is too stiff or does not trough easily. Instead of the conventional belt design in which the carcass is built up from plies of woven fabric, the new belting utilizes plies of weftless cords such as are used in the modern heavy-duty truck tire. Thus every tension member is surrounded with rubber, and, since the cords have no transverse threads obstructing their freedom of movement, they are free to distort themselves, a characteristic which supplements the cushioning qualities of the cover to give added resistance to impact, cutting, and gouging.

The new belting is said to possess extreme transverse and longitudinal flexibility and to have a high resistance to moisture and acid penetration. Since no satisfactory fastener has yet been devised for this belting, it is necessary that it be spliced endless on the conveyer by means of portable vulcanizing equipment. The B. F. Goodrich Co., Akron, O.

Life Preserver

HIS narrow escape from death by drowning caused inventor Clarence V. McGuire to perfect an ingenious type of safety device, Lyf-Boy. It is a six-ounce, ten-inch long rubber unit worn on a belt, which can be instantly inflated in emergency. Inflation is effected by a light, positive squeeze on one end of the container, producing an instantaneous combination of harmless gas-producing chemicals. It is worn on the front of the body, and, when inflated, it brings the wearer to the surface, with nose and mouth exposed to the air.

Tumbling Dummy Balloon

Rubber Diving Suit

AFTER discovering that a helmet alone is not sufficient protection for diving in cold water, B. J. Prestini and Burton Stewart, of Clayton, Wash., began experimenting in 1936 with rubber diving suits. The first idea, using old inner tubes, was discarded when they realized that such suits might easily become torn. They finally decided upon rubberized fabric which was easily tailored, the joints being held together with tire cement and reenforced with strips of fabric.

Mr. Prestini made his helmet from a milk can; while Mr. Stewart's was constructed from a section of a hot water tank. Both helmets were equipped with air valves and a two-way telephone outfit. If entrapped on the bottom, the diver can close the air outlet valve, allowing the air pressure to expand the suit and thus lift him free. It was found necessary to weight the equipment to a total of 150 pounds by means of a belt, breast plate, and shoe soles made from lead. The diver, however, feels buoyant when in the water. The equipment will ordinarily permit depths to 200 feet, and greater than this in an emergency.

The divers have developed their enterprise which began as a pastime, into a profitable business, having retrieved many objects from lake and river bottoms. A unique venture of theirs is the mining of gold from the gold bearing mud found on the bottom of a river, the mud being sucked from the river bottom through a rubber hose of special construction.

Toss-Up Balloon

THE Tumbling Dummy, a novelty toss-up balloon, has its head and body printed in two colors on a contrasting color background. Tossed into the air, it always alights on its cardboard feet. The regular size is 21 inches high, with a waistline nine inches in diameter; the giant size is 31 inches high and has a waistline 14 inches in diameter.

Life-Saving Belt

Herbert Steward

Diver with Rubber Suit

Rubber Industry in America

FINANCIAL

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., and subsidiaries. March quarter: net income after research and process development expenses, amortization and minority interests, $94,077, equal after deducting $12,760 dividends accrued on preferred stock, to 3¢ each on 2,520,368 shares of $10 par combined Class A and Class B common stocks, excluding shares held by subsidiaries. Last net income was $1,364,640, or 54¢ a share on combined stocks.

American Zinc, Lead & Smelting Co., St. Louis, Mo., and wholly owned subsidiaries. March quarter: net profit, $13,053, equal to 20¢ each on 66,553 shares of $5 convertible prior preferred stock, compared with $92,531, equal, after dividend requirements on prior preferred and old $6 preferred stocks, to 1¢ each on 650,254 shares of common stock. Twelve months to March 31: net profit after $25,079 provision for surtax, $105,452, equal to $1.58 each on 66,553 shares of $5 convertible prior preferred stock, contrasted with $188,172, or $2.90 a share on 64,834 shares of prior preferred stock, for the year ended March 31, 1937.

Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y., and subsidiaries. March quarter: net loss, $309,790, after depreciation, obsolescence, dismantlements, and federal income taxes, against net profit of $907,254, or $2.15 a share on 421,981 outstanding capital shares, in the same period of 1937.

Baldwin Rubber Co., Pontiac, Mich. March quarter: net loss, $31,675, contrasted with net profit of $73,957, equal to 23¢ each on 316,757 shares of capital stock, in the preceding quarter, and $176,050, or 63¢ a share on 278,604 shares, in the March quarter last year. Six months to March 31; net profit, $42,282, equal to 13¢ each on 316,757 shares. Owing to changing the fiscal year to end September 30, an accurate comparison with the corresponding period is not available.

Barber Asphalt Corp., Philadelphia, Pa. March quarter: net loss, $115,270, against net profit of $158,716, or 40¢ each on 390,223 capital shares last year. Net profit for the 12 months to March was $469,910, or $1.20 each on 390,223 capital shares, against $691,732, or $1.77 a share, for the year ended March 31, 1937.

Columbian Carbon Co., 41 E. 42nd St., New York, N. Y., and subsidiaries. Three months ended March 31: net profit, $707,155, after depreciation and depletion, minority interest charges, and profit on the sale of securities, equivalent to $1.32 a share on the 537,406 outstanding capital shares. No provision was made for the federal surtax on undistributed profits. For the three months ended March 31, 1937, net profit was $1,448,536, after same charges, equivalent to $2.69 a share on 537,411 capital shares.

Dayton Rubber Mfg. Co., Dayton, O., and subsidiaries. Four months to February 25: net income, $50,510, equal to 11¢ each on outstanding common stock, against $209,850, or $1.01 a common share in the corresponding period of the previous year.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and wholly owned subsidiaries. March quarter: net income, $9,060,602, subject to year-end adjustments, after depreciation, obsolescence, interest, and federal income taxes, and provision for surtax on undistributed profits, contrasted with $16,013,346 for the March quarter last year. After deduction of debenture dividends and dividends on the $4.50 preferred stock and inclusion of $317,865 of the company's proportion of undivided profits of controlled companies not wholly owned, the balance available for the common stock was $7,176,571, equal to 65¢ a share on 11,037,947 average number of common shares outstanding during the quarter. These earnings include the dividend from General Motors Corp. representing the du Pont investment in that company amounting to 22¢ a share on du Pont common stock. The balance available for common stock in the first quarter of 1937, including $432,522 of the company's proportion of undivided profits of controlled companies not consolidated, totaled $14,806,572, equal to $1.34 a share on 11,047,838 average number of common shares outstanding. Earnings for the first quarter of 1937 included dividends from General Motors of 22¢ a share on du Pont common stock.

The profit and loss surplus as of March 31, 1938, was $252,106,577, against $244,772,477 on December 31, 1937, and $240,816,606 on March 31, 1937. Total sales and other operating revenue for the first quarter of 1938 amounted to $52,095,385, against $74,062,665 for the same quarter last year. Operating charges aggregated $44,982,721, against $58,282,247 for the same period in 1937.

Flintkote Co., 50 W. 50th St., New York, N. Y., and subsidiaries. Twelve weeks to March 26: net income, $3,397, compared with $193,585, or 29¢ each on 668,746 shares, a year before. Thirteen months to March 28: net income, $815,235, equal to $1.22 each on 670,346 shares outstanding, against $1,329,321, or $1.99 a share, for the preceding 13 months. Net sales for the recent 12 weeks were $2,833,184, against $3,313,068 a year before, and for the 13-month period rose to $14,683,983 from $14,428,607.

General Cable Corp., 420 Lexington Ave., New York, N. Y. March quarter: net loss after provision for contingencies and surtax, $66,147, against net profit last year of $887,652, equal, after quarterly dividend requirements on 7% cumulative preferred stock and after allowing for dividends on Class A stock, to 47¢ each on 550,730 no-par common shares then outstanding.

Gillette Rubber Co., Eau Claire, Wis. For 1937: net income after $107,800 surtax, $320,336, equal to $1.60 each on 199,762 common shares, compared with $448,445, or $2.24 a common share.

Hercules Powder Co., Wilmington, Del. March quarter: net profit, $656,027, equal to 40¢ each on 1,316,710 common shares, against $1,475,590, or $2.29 each on 585,948 common shares outstanding last year.

Lima Cord Sole & Heel Corp., Lima, O. For 1937: net income after $1,737 surtax, $25,381, against $105,676 in 1936.

New Jersey Zinc Co., 160 Front St., New York, N. Y. March quarter: net profit after depletion and contingencies and including $146,817 proceeds from patents, $652,596, equal to 33¢ each on 1,963,264 shares of $25-par capital stock, against $2,169,841, or $1.10 a share, last year.

Norwalk Tire & Rubber Co., Norwalk, Conn. Six months to March 31: profit before federal income taxes, $39,217.29, against profit of $42,917.51 before

(*Continued on page 75*)

OBITUARY

Walter B. Harding

W. B. Harding

WALTER B. HARDING, U. S. Rubber Products manager, died May 12 as a result of injuries suffered a few days previously when he was hit by an automobile. Born in Manchester, England, in 1872, he was educated in Wellington College and Victoria University. He had but two employers during his entire career. The first was the British Civil Service, in which he served 10 years, and the second, the United States Rubber Co.

Coming to the United States in 1903, Mr. Harding went to Indianapolis and secured a job with the G & J Tire Co., a U. S. Rubber subsidiary. From a clerical position in the sales department, he was successively promoted to salesman, branch control accountant, purchasing agent, advertising manager, assistant sales manager, company secretary, treasurer and, finally, in 1918, company president. He held the presidency of the G & J company for several years. At the time of his death he was manager of the Cycle Tire Division of United States Rubber Products, Inc.

His clubs included the Masonic Order, the Athenaeum, the Associated Employers of Indianapolis, the Kiwanis Club, of which he was a past president, the Meridian Hills Country and the Indianapolis Athletic clubs, and the Cycle Trades of America, of which he was also a past president. Besides he was a former president of the Morris Plan Co. and a past president of the Indianapolis Chamber of Commerce. In 1934 he co-authored a Chamber of Commerce report outlining government housing legislation with reference to the local problem. Throughout his life he made frequent appearances as a public speaker.

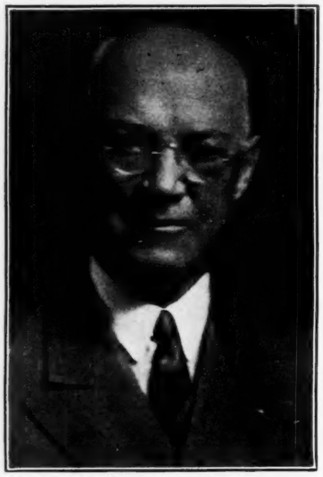
A widower, he is survived by a son.

He was buried in Crown Hill Cemetery in Indianapolis.

L. E. Adams

LYNDON E. ADAMS, 67, president and founder of The Anchor Packing Co., 401 N. Broad St., Philadelphia, Pa., died from a heart ailment after a brief illness, on April 9, in Southern Pines, N. C. He had also served as an officer of the Elkhart Rubber Works, Elkhart, Ind.

Mr. Adams was very active in Masonic charities and belonged to Tristam B. Freeman Chapter, F. & A. M.; Philadelphia Consistory of the Scottish Rite; Mary Commandery, Knights Templar; Lu Lu Temple, of which he was for many years a trustee; Lu Lu Temple Country Club, of which he was a former president; and the Seaview Golf and Whitemarsh Country clubs. The deceased was an ardent golfer.



Blank & Stoller

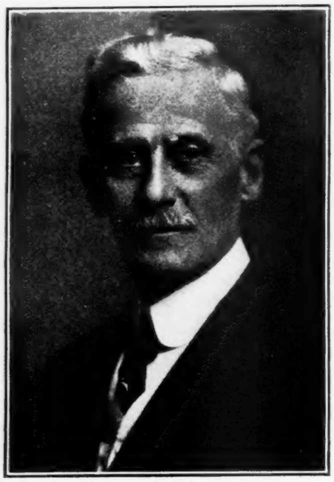
Lyndon E. Adams

He leaves his wife, a son, a brother, and a sister.

Funeral services were held April 13 in Philadelphia.

Russell T. Elwell

RUSSELL T. ELWELL, veteran rubber man, died on March 31 at Quincy, Mass., after a lengthy illness. He began his long career in the rubber industry as a laborer at the Medford Rubber Co., Medford, Mass. Next he became foreman, and other promotions followed rapidly. He later served for more than a quarter-century as superintendent of the Clifton Rubber Mfg. Co., Hyde Park, Mass. In 1899 Mr. Elwell founded the Walpole Rubber Works, Walpole, Mass., which later became the Walpole Tire & Rubber Co. and was purchased in 1915 by the United States Rubber Co. The deceased invented insulating tape and was also the originator of the Cats-Paw rubber heel.



Russell T. Elwell

Mr. Elwell was born in Belfast, Me., May 14, 1855. He attended grammar school.

Surviving are two daughters and a son, Kenneth R. Elwell, connected with the rubber industry in Chicago.

Interment was in Peabody, Mass.

C. S. Goodyear

CLINTON STEPHEN GOODYEAR, a cousin of the famous inventor, died suddenly on May 3 at his home in Naugatuck, Conn. The deceased was born in New Haven, Conn., November 22, 1877. While attending Naugatuck High School, he did some work for the local branch of United States Rubber Co. Upon graduation, in 1897, he became permanently affiliated with the company. The next year he was transferred to the New York office and in 1929 back again to Naugatuck. His duties were primarily in the cost and statistical department.

Surviving are his wife, a son, two brothers, and a sister.

Funeral services were conducted May 5. Burial was in Grove Cemetery.

Wm. H. Balch

A HEART attack caused the death, on April 27, of William H. Balch, president and director of The Faultless Rubber Co., Ashland, O., since 1934. He had joined the company in 1910 as general sales manager and when he left Faultless in 1926 he was also a director. He next was employed outside the rubber industry, but in 1933 came back to Faultless as executive vice president.

Mr. Balch was a native of Hamilton, Ont., Canada, (1868), where he was educated. Before he joined Faultless he had been with a jewelry concern in New York, N. Y.

He was a trustee of Ashland College, president (1930) and for many years a director of the Ashland Country Club, organizer and president (1922) of the Ashland Rotary Club, organizer of the Ashland Community Chest Association, a member of the War Industries Committee on Surgical Rubber Goods, and for many years a member of the executive committee of the Rubber Sundries Manufacturers Division of The Rubber Association of America.

His wife survives Mr. Balch.

Funeral services were conducted on April 29. Interment was in Ashland Cemetery.

Richard C. Lewis

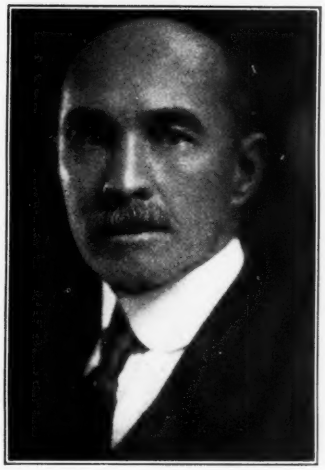
INCLUDED among the victims on the passenger plane that crashed in flames near Cleveland, O., on May 24 was Richard C. Lewis, 39, sales engineer of Farrel-Birmingham Co., Inc., Ansonia, Conn., who was on a business trip to the Midwest. He had joined the company as a draftsman following his graduation from Worcester Polytechnic Institute in 1919. Later Mr. Lewis became a designer of various machines and for some years was connected with the Cleveland office of the company. About four years ago he returned to Ansonia and engaged in sales engineering work. At the time of his death Mr. Lewis was head of the rolling mill department.

He belonged to American Society of Mechanical Engineers, American Society for Metals, George Washington Lodge, F. & A.M., Naugatuck Lodge, I.O.O.F., William H. Gordon Post, American Legion, and Christ Episcopal Church. His college career was interrupted during the World War when he entered the aviation corps in April, 1918. He leaves a wife and a son.

Charles T. McCarthy

THE community of Naugatuck, Conn., and the plant of United States Rubber Products, Inc., there lost a valued friend, who can never be replaced, on April 25 when Charles T. McCarthy died from a cerebral hemorrhage. He was born in Hanover, N. H., on December 31, 1867, and later attended Dartmouth College, to graduate the youngest man in his class 50 years ago.

In March, 1889, he became a receiving clerk in the Goodyear Metallic Rubber Shoe Co. in Naugatuck. By 1900 he was elected secretary of the company. In 1918 Mr. McCarthy became secretary of the Goodyear India Rubber Glove Co., Naugatuck, and the next year was made factory manager of both companies after they had merged their activities. He was chosen a director in 1921, vice president in 1928, and treasurer in 1929. When U. S. Rubber Products Inc., absorbed the individual company structure in 1934, Mr. McCarthy remained in an executive capacity, mostly interested in industrial relations.



Charles T. McCarthy

The deceased was also prominent in the affairs of his community. He was a director of the Naugatuck Building & Loan Association since its organization in 1922; a member (since February, 1929) and vice president (1930-31) of the Naugatuck Rotary Club; a director of the Risdon Mfg. Co. since its organization in 1910, of the Naugatuck Chamber of Commerce (1921-27), and of the Morris Plan Bank; a trustee of the Whittemore Memorial Library; secretary of the Naugatuck Board of Trade; and a devout parishioner of St. Francis Church. Mr. McCarthy was also an active Dartmouth alumnus, a baseball fan, a football rooter, and a coin and stamp collector.

Surviving are his sister, two nephews, and two nieces.

A solemn high mass of requiem was celebrated at St. Francis Church on April 28. Burial was in Hanover.

FINANCIAL[1]

(*Continued from page 73*)

taxes in the same period of the previous year.

Pharis Tire & Rubber Co., Newark, O. March quarter: net profit, $82,845, equal to 37¢ each on 220,000 capital shares, against $27,376, or 12¢ a share, last year. Gross sales, $1,737,415, against $1,684,130.

Raybestos-Manhattan, Inc., Passaic, N. J. Quarter ended March 31: net loss, $171,448.37 after absorbing all costs and expenses, including provisions of $188,572.32 for depreciation.

Thermoid Co., Trenton, N. J., and domestic subsidiary. Year ended March 31: net loss, $115,459, against net profit of $309,085, or 41¢ each on 458,334 common shares, for the year ended March 31, 1937. Quarter ended on March 31: net loss, $95,741, against a net profit of $140,394, equal after dividend requirements on $3 preferred stock to 24¢ a share, in the same period in 1937.

The United Shoe Machinery Corp., 140 Federal St., Boston, Mass. Year ended February 28: net income of $10,146,152 after charges and federal income taxes, equivalent to $4.24 each 2,292,548 common shares, excluding 37,041 held in the treasury, and after dividend requirements on the 6% preferred stock. For the year ended February 27, 1937, the corporation had a net income of $11,316,128, equal to $4.74 each on 2,291,958 common shares then outstanding. Current assets February 28, 1938, including $17,834,012 cash and marketable securities totaled $30,322,472, current liabilities were $4,190,200. These compared with cash and marketable securities of $23,216,818, current assets of $35,143,026 and current liabilities of $8,904,068 on February 27, 1937.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. March quarter: net income, $2,031,230, against $5,341,512 for the similar 1937 period, a 62% decrease. Net income for the 12 months ended March 31, 1938, was $16,816,126, against $16,708,349 for the year ended March 31, 1937. Sales billed for the first three months of 1938 were $42,067,250, against $46,673,300 for the like period in 1937, a 10% drop. Billings for the year ended March 31, 1938, were $201,742,257, against $167,161,051 for the 1937 period, a 21% increase. For the year ended March 31, 1938, orders were $193,296,046 against $214,248,419 for the same period last year, a 10% decrease.

New Incorporations

Brady-Sigler Rubber Co., Inc., 744 Broad St., Newark, N. J. Capital 2,500 shares, no par value. W. A. Brady and S. C. and J. Sigler, all of 744 Broad St. Manufacture rubber tires, tubes, and mechanical rubber goods.

Even-Cure Tire Rebuilding Corp., 80 Lexington Ave., Passaic, N. J. Capital 100 shares, no par value. J. L. Van Kirk, 13 E. 8th St., and M. H. Rudd, 39 Burgh St., both of Clifton, N. J., and J. Varnacotola, 195 Autumn St., Passaic. Manufacture tires and tubes and rebuild tires.

Retread Tires, Inc., 115 Market St., Paterson, N. J. Capital 400 shares preferred and 400 shares common. M. M. Cohn, 410 18th St., J. Simonton, 56 Holsman St., and H. Zax, 482 E. 25th St., all of Paterson. Manufacture tires, tubes, patches, and retread tires.

Victory Rubber Carbon Co., Inc., Wilmington, Del. Capital $150,000. W. H. and H. H. Scherffius, Grand Island, and W. J. Scherffius, Lincoln, all in Nebraska. Acquire U. S. rights for the carbon-treated rubber mats, appliances, accessories.

[1] Dividends Declared on page 103.

EASTERN AND SOUTHERN

THE relatively low level of business activity which characterized the first quarter of 1938 continues, with an additional decline in industrial production; while the condition of the railroads is one of the most serious problems confronting the nation today.

Figures of the National Industrial Conference Board on its regular monthly investigation of wages, hours, and employment in 25 manufacturing industries indicate no general reduction in wage rates. Earnings per hour averaged 71.4¢ in March against 71¢ in February. Average weekly earnings were also slightly higher, although a drop of 1.1% appeared in total man-hours worked.

The Conference Board's investigation indicates a general, although not large, decline in employment in the various manufacturing industries covered. The decline was greatest in the automobile (3.6%), electrical manufacturing (4.1%), book and job printing (6.0%), and wool industries (7.3%). Increases in employment are shown, however, in three industries: iron and steel, lumber and mill work, and paper products. Improvement in total man-hours worked and in payroll disbursements is noted in seven industries.

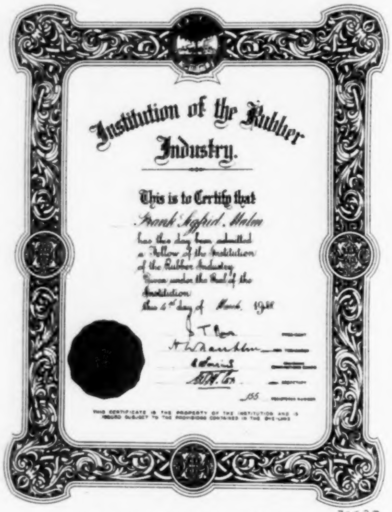
A recent nation-wide survey among representative business men disclosed that more than half of those reporting expect a substantial business recovery in the fall; one quarter look for a trade upturn in the coming winter; while the remainder do not anticipate recovery until next year.

Unseasonable weather throughout the country has also retarded trade. Heavy rains in some sections, however, led to a rise in the sale of rainwear and rubbers.

Employment in New York State in April dropped 2%, a sharper decrease than the usual seasonal decline; while payrolls lost 4.5%, according to an official report. The rubber industry was included in the group which showed net losses of 3% or more in employment.

Americans Elected Fellows of I.R.I.

In recognition of their achievement in the rubber industry, two Americans, A. R. Kemp and F. S. Malm, both of Bell Telephone Laboratories, Inc., 463 West St., New York, N. Y., have recently been elected as fellows of The Institution of the Rubber Industry, the British organization whose purpose is to promote the efficiency of the rubber industry, which depends largely on technical skill and initiative. Those awarded fellowship diplomas by this organization must have previously been regular or associate members, attained a responsible position in the rubber industry, and been actively engaged in the industry



I.R.I. Fellowship Diploma

for at least ten years, and created processes, inventions or contributed materially to the advancement of knowledge of the industry through publication.

Since 1921, when the Institution was founded, only 15 Americans have been given this honor through election to fellowship. As of September 1, 1937, two associate and 14 regular memberships were held by Americans.

Other Americans having fellowships with the date of their award are as follows: John M. Bierer (1928), Boston Woven Hose & Rubber Co., Cambridge, Mass.; C. R. Boggs (1930), Simplex Wire & Cable Co., Cambridge; E. R. Bridgwater (1932), E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; R. P. Dinsmore (1928), Goodyear Tire & Rubber Co., Akron, O.; H. E. Elden (1932), The Dunlop Tire & Rubber Corp., Buffalo, N. Y.; H. L. Fisher (1937), U. S. Industrial Alcohol Co., Stamford, Conn.; W. C. Geer (1928), Ithaca, N. Y.; W. A. Gibbons (1937), United States Rubber Products, Inc., Passaic, N. J.; E. A. Hauser (1926), Massachusetts Institute of Technology, Cambridge, Mass.; G. Oenslager (1936), The B. F. Goodrich Co., Akron, O.; A. A. Somerville (1928) R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y.; D. Spence (1928), Pacific Grove, Cal.; W. B. Wiegand (1925), Columbian Carbon Co., 41 East 42nd St., New York, N. Y.

R. M. A. Announces New Crude Rubber Type Samples

The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y., recently announced the availability of the Association's new crude rubber type samples. The new types will become effective August 1, 1938, to supersede the present ones which have been in effect since October 4, 1929. This action of the R. M. A. has been endorsed by the Rubber Trade Association of New York, Inc. The samples, representing 22 different grades, are of actual physical rubber to be used as a standard for evaluating rubber purchased by manufacturers. The R. M. A. wishes to direct the attention of all rubber manufacturers to this important step in the crude rubber quality standardization program and to recommend its general adoption and support.

After the fulfillment of present orders, the R. M. A. will have a limited surplus of type samples on hand; these will be sold at a price of $5.50 per sample, f.o.b. New York. Printed descriptions of these crude rubber type samples, including several for which physical samples have not been prepared, may be obtained upon request to the R. M. A. Included with these descriptions are the Association's standard packing specifications for crude rubber.

Seven Acres of Exhibits at Toy Show

Improved appearance, achieved by new finishes and designs, was the main feature of rubber goods displayed at the 1938 American Toy Fair, held in New York, N. Y., under the sponsorship of the American Toy Manufacturers of the U. S. A. Inc., from April 25 to May 7. Exhibitors from 35 states took part in this year's fair, which occupied seven acres of floor space. As in the past, a large number of toy manufacturers exhibited their products at the Hotel McAlpin. Others had their displays at permanent show rooms at 200 Fifth Ave. and other locations throughout the city. Approximately 20 rubber manufacturers participated in the show.

At the McAlpin

Lee-Tex Rubber Products Corp., 904-912 Blackhawk St., Chicago, Ill., displaying novelty balloons exclusively, featured a balloon with a new polychrome finish, producing a four-color mottled effect. Weaver health and scholastic balls for football, basketball, and soccer were shown by C. B. Webb Co., Lebanon, Pa. The Anderson Rubber Co., Akron, O., showed its complete line of athletic equipment and a varied assortment of balloons, including a unique tennis balloon game.

The Seiberling Latex Products Co., Akron, O., had on display its complete line of all-rubber reproductions (molded and inflated) of Walt Disney characters, featuring Snow White and the Seven Dwarfs. Sieberling has produced some striking novelties, utilizing a new decalcomania process in rubber

for transferring these figures to balls and place cards made from flat rubber stampings with stand-up bases. Sundries and bathing wear were also shown by Sieberling.

Rubber toys representing soldiers, animals, automobiles, farm equipment, etc., were exhibited by the Auburn Rubber Corp., Auburn, Ind. Brick building blocks of molded rubber, the bricks having fit-together joints, were also on display here. Games in rubber, an innovation for Auburn, included baseball, racing, horseshoe, Pen Dux, and other games.

The Pennsylvania Rubber Co., Inc., Jeannette, Pa., presented its new line of play balls in brilliant colors. These balls are treated with a new dye finish, which requires no lacquer and is claimed to have a high degree of permanence. Tuck-in valves on play balls featured the exhibit of The Seamless Rubber Co., Inc., New Haven, Conn., which also showed raincapes and combs. The Sun Rubber Co., Barberton, O., introduced this year a wetting doll and animal characters, notably Porky Pig, besides other rubber items.

At Fifth Ave. Showrooms

Pioneer Rubber Co., Willard, O., displayed a wide variety of balloons, including snake, toss-up, faces with roving eyes, and advertising specialties; rubber novelties and gloves.

Fulton Specialty Co., Elizabeth, N. J., showed rubber type printers and "Arti-Stamp" rubber stamp and crayon sets. The rubber relief characters, which can be colored after stamping, embrace a wide variety of subjects as Snow White and the Seven Dwarfs, and other Disney creations, Wild West and army characters, a circus and farm and zoo outfits; and, of course, the regular letter and numeral rubber stamps, many suitable for sign making. A miniature printing press was another feature.

Ideal Novelty & Toy Co., 2310-43rd Ave., Long Island City, N. Y., included in its very attractive display of dolls realistic baby dolls with rubber parts, including hard rubber heads, arms, and legs with a "voice" inside.

Superior Type Co., 3940 Ravenswood Ave., Chicago, Ill., exhibited rubber stamp printing sets of the animal kingdom, the circus, transportation means, and alphabet and numbers; Swiftset rotary (hand) printing press, comic strip printing sets including Popeye, Dick Tracey, Orphan Annie, Perry Winkle, Buck Rogers, and Smitty.

Barr Rubber Products Co., Sandusky, O., featured balloons, gas inflated and sponge gaily decorated balls, molded rubber novelties and toy automobiles, jackstone sets, paddle balls, rubber dog toys, and the firm's latest specialty, seamless latex bathing caps made in the seven balloon colors.

Paragon Rubber Corp., Easthampton, Mass., showed baby dolls of rubber or with rubber parts such as unbreakable hard rubber heads, which can cry, drink, "wet," and sleep, mostly with layettes in cedar chests, boxes, or overnight cases.

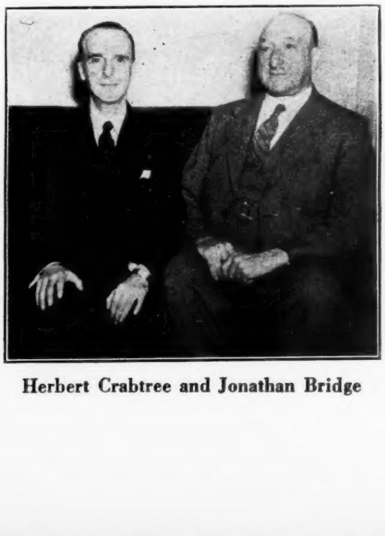
Schavoir Rubber Co., featured rubber dolls, toys, and novelties, all of soft molded rubber with whistle effect, including animals; floating bathtub (aquatic) subjects; pet shop playthings, as pup heads, bones, rings and rodents; Nursery Rhyme characters; comic strip beings as Popeye, Wimpy, Olive Oyl, the Jeep, and the Captain and the Kids, all in gay colors; and rubber advertising specialties.

English Machinery Executives Visit U. S. A.

Jonathan Bridge, chairman of David Bridge & Co., Ltd., Castleton, Rochdale, England, together with Herbert Crabtree, joint managing director of the same company, sailed May 11 on the *Queen Mary* from New York to London. Mr. Bridge and Mr. Crabtree had arrived in New York on April 21 and then visited manufacturers of rubber products and rubber machinery in this country.

The English company, formed 45 years ago by David Bridge, has supplied rubber machinery to plantations and factories for the past 38 years and now acts as manufacturing and sales agents for the entire line of the National Rubber Machinery Co. and for Banbury mixers through license arrangements with the Farrel-Birmingham Co., Inc., covering all British possessions, except Canada, and for the Continent of Europe. In addition to the above American machinery, the company manufactures its own line of mills, calenders, and other types of machinery, including cable making machines, so that today it is capable of completely equipping a rubber factory.

Jonathan Bridge and his brother David, who now control the company, are the last of five brothers who inherited the business from their father. Mr. Bridge stated that although not normal, business conditions in England appeared to be considerably better than in this country. This was his first visit to the United States, but Mr. Crabtree had been here a number of times previously. He was impressed with the vastness of this country and the extent of the manufacturing operations at the various plants they visited. While here, Mr. Bridge and Mr. Crabtree were entertained by officials of the National Rubber Machinery Co. whose plants at Akron and Columbian, O., and Clifton, N. J., they visited and by officials of the Farrel-Birmingham Co., Inc., Ansonia, Conn., where they inspected Banburys under construction.



Herbert Crabtree and Jonathan Bridge

Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y., through its tire division recently inaugurated a national campaign to promote greater safety in motor car driving. The campaign, climaxed by observance of National Tire Safety Week, May 14-21, was designed to replace an estimated 59 million tires due to become smooth this year, according to A. L. Viles, R. M. A. president. Tire manufacturers participating were: Cooper Corp., Findlay, O.; Corduroy Tire & Rubber Co., Grand Rapids, Mich.; Dayton Rubber Mfg. Co., Dayton, O.; Firestone Tire & Rubber Co., Akron, O.; Fisk Tire Co., Inc., Chicopee Falls, Mass.; General Tire & Rubber Co., B. F. Goodrich Co. and Goodrich Associated Lines, and Goodyear Tire & Rubber Co., all of Akron; Kelly-Springfield Tire Co., Cumberland, Md.; Lee Rubber & Tire Corp., Conshohocken, Pa.; Mansfield Tire & Rubber Co., Mansfield, O:; McCreary Tire & Rubber Co., Indiana, Pa.; Norwalk Tire & Rubber Co., Norwalk, Conn.; Pennsylvania Rubber Co., Jeannette, Pa.; and United States Rubber Products, Inc., 1790 Broadway, New York.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., according to A. W. Robertson, chairman of the board, will "do its share" this year toward recovery by spending about $12,000,000 on new buildings, new machinery and equipment, and other improvements and repairs throughout Westinghouse properties. Last year's expenditure, Mr. Robertson stated, was made to keep up with mounting demands on the company for increased production, whereas this year's appropriations are made principally "on faith that business conditions will improve and on the company's desire to be ready for increased production when it comes."

The Greater New York Fund, 52 Broadway, New York, N. Y., has announced that Francis B. Davis, Jr., chairman of the board and president of the United States Rubber Co., 1790 Broadway, New York, is head of the committee to solicit contributions of firms in the rubber industry in the $10,000,000 campaign of the Greater New York Fund to supplement finances of private welfare and health agencies. Cyrus Ching, director of public relations, United States Rubber Products, Inc., is vice chairman of the committee. A separate committee headed by A. L. Viles, president of The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, was organized to solicit the contributions of employe groups in the industry.

Brooklyn Color Works, Inc., manufacturer of colors, through Treasurer Baron Isaacs has announced that its plant at 129-143 Cherry St., Brooklyn, N. Y., was taken over by the City of New York for public improvements; consequently the firm had to build a new factory. This will be 200 feet long on Norman Ave. by 100 feet deep on Morgan Ave. and 100 feet on Sutton St., Brooklyn. All new modern equipment has been installed, permitting the concern to double its production, a move necessitated by growing business. The company, besides, will be enabled to expand its line of endeavor.

Foster Dee Snell, head of Foster D. Snell, Inc., firm of chemists and engineers, 305 Washington St., Brooklyn, N. Y., recently addressed the students of chemistry and chemical engineering at The Polytechnic Institute of Brooklyn on "Opportunities in Chemistry and Chemical Engineering."

Dr. I. Drogin, chief chemist, J. M. Huber, Inc., 460 W. 34th St., New York, N. Y., one of the Americans who attended and read a paper at the recent Rubber Technology Conference in London, expects to be abroad about ten weeks making extensive calls in England and France.

The United States Department of Labor, Washington, D. C., recently announced the awarding of supply contracts, valued at $2,469,458, by eight federal agencies. Included in these awards were: General Electric Co., $10,271, for telephone equipment; Habirshaw Cable & Wire Division, Phelps Dodge Copper Products Corp., Yonkers, N. Y., $23,990, electric cable; Okonite Co., Passaic, N. J., $23,990, electric cable; Rockbestos Products Corp., New Haven, Conn., electric cable, $24,374.

National Association of Credit Men, One Park Ave., New York, N. Y., through Henry H. Heimann, executive manager, announced its forty-third annual Credit Congress to be held at St. Francis Hotel, San Francisco, Calif., June 5 to 10. Coincident with this congress, which closes the association's forty-second year of activity since its founding in Toledo in 1896, special industry group meetings will be held, a successful feature for the past seven years. At these gatherings credit executives of each individual industry meet in special industry groups for the mutual consideration of particular credit problems in their respective industries.

Neoprene Production Started

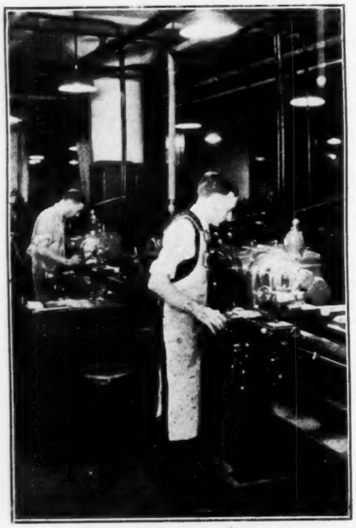
The new plant at Deepwater, N. J., was actually finished on May 16, and checkups were completed on May 23 at which time production was started immediately. The Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., reports that shipments of Neoprene are now being made from new production and that for a short period partial allotment against orders may be necessary, but by the middle or latter part of June there will be sufficient production to assure prompt shipment of all orders including export.

World's Fair Motorcade

The makers of U. S. Tires will play an important part in the nationwide World's Fair 1939 Good-Will tour of 49 cars which left New York, May 2, enroute to Washington, D. C., and all state capitals. The cars, equipped with new U. S. Royal Master safety tires, are driven by U. S. Rubber's field engineering organization. After the New York Preview, the couriers went directly to the 48 state capitals and then will make a circuit of key cities within their respective states. The forty-ninth car will go to Washington, D. C., with the White House as its destination. Each Good-Will car will fly Old Glory and the World's Fair colors of orange and blue. On the top of each car will be mounted a stainless steel miniature model of the Trylon and Perisphere, famous theme building of the Fair.

In addition to representing the World's Fair, the 49 drivers will conduct, with the cooperation of the American Automobile Association, a nationwide safe driving demonstration.

The couriers will visit U. S. Tire Dealers' places of business, along with the stores of other prominent manufacturers whose products have been officially chosen by the Fair.



Westinghouse Electric & Mfg. Co.

Local Lighting at Point of Work Combined with General Lighting of Not Less Than One-Tenth the Intensity, Prevents Eyeshock, Reduces Fatigue, and Speeds Work

The total cost of the World's Fair will be more than $125,000,000. Sixty-four foreign nations have already contracted to participate. Industry, labor, science, and art will all be represented, and more than fifty million people throughout the world are expected to see it.

The American Section of the Society of Chemical Industry, 305 Washington St., Brooklyn, N. Y., recently elected the following officers for 1938-39: chairman, Wallace P. Cohoe; vice chairman, Lincoln T. Work; honorary secretary, Cyril S. Kimball; honorary treasurer, J. W. H. Randall; new committee members succeeding those retiring, James G. Vail, R. L. Murray, A. E. Marshall, N. A. Shepard, and D. P. Morgan. The annual meeting of the parent society is listed for June 20-22 at Ottawa, to which all chemists are invited.

Titanium Pigment Corp., 111 Broadway, New York, N. Y., has appointed Herman A. Pfeifer as New England sales representative with headquarters in Boston, Mass. For the past two and a half years he had been sales engineer with the Bisbee Linseed Co. in Philadelphia, Pa., and formerly had held a similar post with American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York.

Denman Tire & Rubber Co., Warren, O., recently moved its export and sales promotion office from 230 Park Ave. to 52 Vanderbilt Ave., New York, N. Y. This change to larger quarters, stated President W. B. Candless, was necessitated by the expansion of the export department and the greatly increased sales promotion and advertising activities of the company.

MIDWEST

THE Midwest fares no better than the rest of the nation. Last month automobile production declined more than seasonally, although labor trouble is held partly responsible for the drop. An effort is being made by car manufacturers to hold prices as low as possible. Automobile sales are showing less than a seasonal increase; while the drop from last year is on the increase.

A recent report of 32 rubber manufacturing concerns here show 13,156 workers earning $274,000, a drop from the previous month of 2.3% in employes and 1.8% in earnings.

Consolidated Products Co., Inc., 15 Park Row, New York, N. Y., recently purchased for purposes of liquidation the plant of Ahlbell Battery Container Corp., Waukegan, Ill., including buildings, machinery, equipment, supplies, real estate, finished merchandise, raw materials, and furniture.

OHIO

INDUSTRIAL conditions show little change in Ohio. Some plants report slight gains, but these are offset by contractions in others. Steel ingot production was at about 32% of capacity. Although not generally considered an important farm state, Ohio reports the best crop outlook in years.

Goodyear Activities

The case of the Federal Trade Commission versus The Goodyear Tire & Rubber Co., Inc., Akron, went to the Supreme Court on March 25 when the commission asked for a decree upholding its finding that the company "cease and desist" extending alleged "preferential prices" on goods bought by Sears, Roebuck & Co., Chicago, Ill. This F. T. C. appeal to the Supreme Court seeks a reversal of a decision by the Sixth Circuit Court of Appeals, in the course of which the lower court refused to recognize the validity of the commission's order because Goodyear has stated it ceased the practice complained against. The Supreme Court took the case under advisement following hearing in Washington, D. C., on May 2. A fortnight later the Supreme Court reversed the U. S. Circuit Court of Appeals and remanded the case back to that court for decision on its merits.

New Tank for Use in Lining Curing

A 93-ton tank about as large as a Goodyear airship, but weighing 40 times as much, purchased by Goodyear from a local machine shop, for use in curing the rubber linings applied inside other tanks, recently was installed in the company's Plant Three.

Old Guard Note Returned

In May, 1935, six members of the Goodyear Old Guard (those employes still with the company since President Paul W. Litchfield joined it in June, 1900) visited England as guest of their president. On June 8, 1935, on the way home, while several hundred miles south of Newfoundland, at latitude 55W, longitude 41N, the party wrote a note, all signed their names, asked the finder to report in, and then threw the bottle containing the message overboard. On March 22, 1938, a reply was received from Thomas Fowler, from Andries Island, Bahamas, about 1,800 miles from the spot where the bottle was dropped, after about 2½ months less than three years.

Speedway Plantation

In Costa Rica, Goodyear has a 1,000-acre tract, its Speedway Plantation, acquired in 1936, where 150 acres previously planted are already producing rubber. Planting of the remaining 850 acres will be finished this year; these will start producing in 1944-45.

Goodyear Tire "Especially Manufactured for the President of the Republic Señor Leon Cortes, from the First 'Hevea' Plantation Rubber Commercially Exported from Costa Rica" (*Translation of Spanish Inscription*)

From this plantation in February came to Akron the first rubber ever commercially exported from the Central American republic. The rubber was made into a set of white sidewalls All-Weather Tread tires, inspected by President Litchfield, A. G. Cameron, vice president and manager of Goodyear's Export Company, and J. J. Blandin, manager of crude rubber purchasing. After their inspection the casings were shipped to New York and thence by boat to Costa Rica, where they were received by J. H. Baumann, Goodyear's zone supervisor for Central America, and representatives of Cia Automotoriz, Goodyear distributer in San Jose. They presented the tires and a set of LifeGuards to President Leon Cortes, who had them installed on his own car.

LifeGuard Legion

A national safety organization for motorists, modeled somewhat along the lines of the famous Caterpillar Club for aviators and named LifeGuard Legion, was formed last month to be composed of motorists who have avoided serious accident and possible injury or death through use of LifeGuards, the new safety device recently introduced by Goodyear.

Consisting of a reserve tire within a conventional tube, a LifeGuard has the effect of turning a blowout at high speed into a slow leak, allowing the driver to come to a safe stop without a swerve into oncoming traffic or into the ditch, Goodyear officials said.

When a motorist has avoided serious accident through use of LifeGuards, he automatically becomes a member of the LifeGuard Legion and receives a bronze plaque in commemoration of his narrow escape. Front of the plaque shows in bas-relief the heads of an old man, a young man, a young woman, and a child, signifying that LifeGuards provide safety for persons of all ages; while on the reverse side is an appropriate inscription.

Mohawk Reorganization

Mohawk Rubber Co. of New York, Inc., Akron, last month adopted a complete reorganization plan, substantially as follows. Settlement was made with extended creditors with claims aggregating $651,000, eliminating more than one half million dollars of liabilities. A loan of $130,000 made this step possible. The required number of debenture holders consented to extending the maturity date of $253,000 debentures to April 1, 1948, with a reduction in the rate of interest from 6 to 5%. Stockholders approved recapitalization. The preferred stock has been eliminated; such stockholders are to receive five shares of common stock for each share of preferred held. Over one million dollars of accumulated dividends have been eliminated. The common stockholders are to receive one share common stock for each five shares owned. There were 117,000 shares of common stock outstanding, and there will be 131,000 shares of common stock issued after the exchange.

Mohawk will have a current position of four to one with working capital of $386,000. A surplus deficit of $1,-891,000 has been eliminated, and the new plan creates a capital surplus of $780,000. A net profit, after all charges including plant depreciation of $88,645, amounted to $15,995 for 1937 operations. This is the first net profit for the company since 1929.

Officers and directors for the current year are: R. E. Bloch, president and treasurer; K. A. Moody, secretary; C. E. Sauvain and M. M. Huff, assistant treasurers; R. H. Bishop, Jr., J. B. Huber, C. W. Enyart, H. Lloyd Williams, W. L. Flory, and Mr. Bloch, directors. The company is celebrating its twenty-fifth anniversary this year.

Pharis Tire & Rubber Co., Newark, according to O. A. Helser, personnel director, is running at 100% capacity and has an annual payroll of over $1,-000,000. He made these statements at the recent annual meeting of the Chamber of Commerce, Newark.

The annual meeting of the Pharis company was held on April 27 at which all officers and directors were reelected. The former include Carl Pharis, president and general manager; W. A. Patterson, vice president and sales manager; W. I. O'Bryan, secretary-treasurer; and C. D. Boies, comptroller.

The Akron Standard Mold Co., Akron, has announced through A. J. Fleiter, vice president and general manager, that it is now represented in foreign countries except Canada by Binney & Smith Co., 41 E. 42nd St., New York, N. Y.

Firestone News

The Firestone Tire & Rubber Co. has acquired the Andrews-Alderfer Co., both of Akron, manufacturer of Contralastic rubber thread, a latex product. Contralastic thread will be manufactured at the Firestone latex plant at Fall River, Mass., in the future.

Firestone had a model tire plant in operation at the Cotton Textile Exposition staged last month during Cotton Carnival Week which was held in Memphis, Tenn.

The Firestone Local of the United Rubber Workers of America on May 15 by a very large majority voted to accept a year's contract with the Firestone company, almost identical with the expiring contract.

Vice President Harvey S. Firestone for the second time acted as official referee at the annual Indianapolis Speedway automobile race on Memorial Day.

The Seiberling Rubber Co., Akron, has announced that its dealer in Fresno, Calif., The Thompson-Ducey Tire Co., is said to have the largest tire recapping shop in the United States. It is believed, furthermore, to be the only company in the country that recaps tractor tires. The sizes range from 5.00:16 passenger to 13.50-24 truck and 12.75-28 tractor tires. Thompson-Ducey installed its recapping service two years ago and now uses eight molds.

The Aetna Rubber Co., 815 E. 79th St., Cleveland, held its annual stockholders' meeting on April 21 at which the proposed sale of the Cleveland plant and business was not approved. Directors were also elected for the ensuing year, as follows: S. T. Campbell, Robert R. Christian, Charles A. Heil, Charles Mashek, and M. C. Teasdale. The board in turn elected the following officers: Mr. Heil, president; Mr. Mashek, vice president; and Mr. Teasdale, secretary-treasurer.

Goodrich Appointments

William S. Richardson, merchandising manager of The B. F. Goodrich Co., mechanical goods division, Akron, was named general sales manager of the division succeeding the late C. E. Cook, according to Vice President J. H. Connors. Mr. Richardson joined Goodrich in 1926, was staff superintendent of mechanical rubber goods production, and in 1931 was appointed merchandising manager.

L. H. Chenoweth, with Goodrich in mechanical goods sales capacities since shortly after his graduation from Harvard University in 1912 and assistant merchandising manager of the division since 1931, becomes merchandising manager.

V. L. Wanselow, formerly truck and bus tire manager in the Chicago district, was appointed western manager of the national accounts sales division, announced C. B. O'Connor, general tire sales manager. Mr. Wanselow, who will continue with headquarters in Chicago, succeeds C. W. Wacker, recently transferred to Detroit in the capacity of manufacturers' sales representative.

Transferred to Singapore

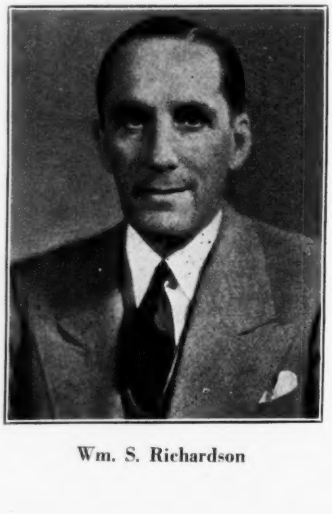
G. M. Naylor, manager of the Goodrich crude rubber purchasing division, Akron, left on May 16 for Singapore, Straits Settlement, British Malaya, according to A. D. Moss, director of purchases. Mr. Naylor, accompanied by Mrs. Naylor, left Los Angeles on May 28 and is scheduled to arrive in Singapore, June 23 to serve as managing director of the Goodrich Company (SS), Ltd., succeeding H. C. Bugbee, on duty there during the last three years, and who will return to the Akron offices. Mr. Naylor, a buyer of crude rubber since 1917, came to Goodrich in 1929. He previously has served two terms in Singapore.

New Sales Division

A new division to handle the sale of rubber-like materials and synthetics, headed by Dr. H. E. Fritz, was announced by Mr. Richardson. Dr. Fritz, with Goodrich for more than 13 years, has been in charge of the sale and development of Koroseal, a rubber-like synthetic material now being used in a number of industries. Goodrich is the first rubber company to recognize the necessity of grouping rubber-like and synthetic materials in one specialized sales division, according to Mr. Richardson.

Well-Wearing Galoshes

Thomas Riise, a machinist in Goodrich Dept. 3965, Small Molds, bought a pair of Goodrich galoshes in the Fall of 1920, which he has since worn every winter, even abroad in Norway, and this footwear has never required any repairs, according to the owner, who expects much more service from the galoshes.



Wm. S. Richardson

NEW JERSEY

WHILE some New Jersey rubber manufacturers experienced increased orders, others find business still declining. Manufacturers of druggists' sundries report an uplift, with increased working hours. Hard rubber output continues to drop.

Jos. Stokes Rubber Co., Trenton, reports no improvement at either the Trenton or the Canadian plants.

U. S. Rubber Special Co., Trenton, moved from 150 Hamilton Ave. to High and Canal Sts., where the concern has larger quarters.

Acme Rubber Mfg. Co., Trenton, reports business increased during the past month, causing officials to become optimistic. President Horace T. Cook, also head of Hamilton Rubber Mfg. Co., Trenton, spent some time with his family at Sea Island, Ga.

Luzerne Rubber Co., Trenton, has let a contract for a one-story storehouse, to replace the one destroyed by fire some time ago. Orders for hard rubber goods declined recently. President Bruce Bedford has returned with Mrs. Bedford from a lengthy stay at Pinehurst, N. C.

Murray Rubber Co., Trenton. Receivership has been discharged by Federal Judge Philip Forman. The court also ordered the distribution of a certain asset still remaining. The order was issued at a hearing to show cause on the receiver's report.

Citron & Byer, Trenton, purchased the real estate formerly owned by the Lambertville Rubber Co., Lambertville. The new owner will lease the plant for industrial purposes. The Trenton concern also owns the old plant of the New Jersey Rubber Co. at Lambertville.

Charles E. Stokes, president of the Home Rubber Co., Trenton, has been spending some time in the Pocono Mountains.

The Martin Rubber Co., Long Branch, has announced that J. A. MacEwan has become associated with the organization where he will be in full charge of the press department. Mr. MacEwan was formerly connected with MacEwan & Smith Corp., Woodbridge.

R. J. Goehrig, treasurer of Whitehead Bros. Rubber Co., Trenton, was on a three-week business trip through the South and West.

Pierce-Roberts Rubber Co., Trenton, is experiencing increased business and is now operating with two shifts. The concern reports a large number of new orders.

(Continued on page 82)

NEW ENGLAND

ONE report states it is difficult to discern any improvement in the business situation in New England. Unemployment continues to gain. While conditions vary widely between industries and localities, on the whole industrial operations in this section are greatly curtailed.

Payrolls of rubber manufacturers in Rhode Island for April rose 5.5% over those for March, according to the Brown Business Research Bureau. Although 12.5% less than the total for April 1937, April's total this year was $261,569.

Rubber Bracelet for Lobsters

The Maine lobster is reputedly the best, but often frozen crawfish is offered as the genuine article. Consequently the Maine Development Commission in cooperation with the Maine Department of Sea and Shore Fisheries inaugurated a campaign against such misrepresentation and developed a device consisting of a band of virgin rubber with an aluminum disk bearing the official state trade mark and the words, "State of Maine Lobster," to be slipped over the largest claw of the lobster.

Bourdette vs. Anaconda

A new trial has been ordered by the Rhode Island Supreme Court in the suit brought by Bourdette & Co., Inc., Malden, Mass., to recover $35,000 damages from the Anaconda Wire & Cable Co. for alleged breach of warranty in a contract. A jury in the Superior Court for Providence County on October 23, 1936, returned a verdict in favor of Anaconda, awarding it $1,602.06 as a set-off against the claim. The Supreme Court's opinion sustained the exception taken by the plaintiff to a portion of the trial judge's charge to the jury. Bourdette & Co. in its suit claimed a net loss of $17,000 in business and profits during 1933 because wire of 39-gage was allegedly furnished for loud speaker coils instead of 38-gage as specified. The Anaconda company contended that 38-gage wire was used, but that the wire was stretched in making the coils. It sought to collect $1,559.18 for coils delivered after the controversy arose and for which there had not been payment. In awarding the set-off the jury included interest.

James H. Holland has resigned his position with the American Wringer Co., Woonsocket, R. I. He has been in the employ of this concern continuously for more than a quarter-century. In recent years he has been in charge of the traffic and order departments.

Cabot Creates Solar Energy Fund

Sun power by conversion of solar energy into useful forms will be sought in a far-reaching program of chemical, mechanical, and electrical research to be started soon at the Massachusetts Institute of Technology, Dr. Karl T. Compton, president of the Institute, announced last night. This great undertaking is made possible, he said, by a gift of $647,700 from Dr. Godfrey L. Cabot, head of Godfrey L. Cabot, Inc., carbon black manufacturer, Boston, Mass., who has long been interested in finding means of utilizing the inexhaustible energy of the sun as a source of useful power. The fund will be employed for these studies for at least 50 years, after which it may be used for such other purposes as the Corporation of the Institute may select.

While scientists at the Massachusetts Institute of Technology concentrate on direct physical and chemical methods of utilizing the energy of the sun, Harvard University, which last year received a similar grant from Dr. Cabot, is seeking methods of increasing the storage rate of solar energy in plants in forms suitable for human use.

"The program will be started," Dr. Bush, M.I.T. vice president, said, "with the cooperation of members of the Institute's staff in various fields, who will have special assistance and such equipment as may be necessary for advancing their studies."

The Institute already has excellent facilities for starting this important research on several fronts.

Chemical conversion of radiation into useful forms of energy is considered one of the important approaches to the utilization of sun power. In such studies of the reactions between organic compounds and radiation the Institute's spectroscopic laboratory is expected to be of great assistance. Still another approach lies in the pioneering research on colloids, conducted in the Department of Chemical Engineering.

The New England Butt Co., Providence, R. I., recently shipped a so-called "twinning" machine to the Pacific Coast, where it will be used in the manufacture of lamp and heater cords and cords used for conducting electricity to small portable tools, vacuum cleaners, etc. The machine is specially designed to twist together two or more separate wires into a cable. The rotor of this machine revolves at 350 revolutions per minute. It supports two reels, 24 inches in diameter by 12 inches traverse, and another reel in the rear. At the front of the rotor, space is provided for 48 cops of yarn three inches in diameter by ten inches traverse, for filling in the crevices of the twisted cord to insure a smooth outer surface of the product. The 30-inch diameter capstan pulls the cord and cotton filler through the machine, passing it to the front, where a 24-inch diameter by 12-inch traverse reel is located for winding the finished product. A traverse motion is provided to guide the product evenly on to the reel. The machine is driven by a 7 h.p. motor.

Quabaug Starts Reclaiming Plant

The Quabaug Rubber Co., North Brookfield, Mass., has been installing equipment necessary for manufacturing its own reclaimed rubber requirements. The plant, which was expected to be in operation early in June, will have a monthly capacity of approximately 200,000 pounds. General business has been very satisfactory at the Quabaug factory, which has been operating on a full schedule of three shifts, five days a week. The firm's products are chiefly soles, heels, rubber tile, matting, and stair treads.

Fisk Items

Third-Line Tires Undesirable

In a letter to 146,000 agents throughout the United States, said to be the largest mailing in the history of the industry, Col. Charles E. Speaks, president of the Fisk Tire Co., Chicopee Falls, Mass., recently warned that future success of the tire business rests upon the financial soundness of the nation's tire dealers. He cautioned them against the confusion to themselves and the public produced by many of the promotional efforts used in current merchandising and cited as an example a series of new third-line tires now being introduced.

While Fisk is also introducing a new tire, Fisk "75," to meet this competition, Colonel Speaks asserted:

"I do not believe either the tire dealer or the consumer needs these new lines. Tires now on the market already meet all requirements of both price and quality buyers. New additions are only competing with existing lines, needlessly increase inventories, and add nothing to the fundamental soundness of the trade situation, either to the dealer, to the consumer, or, in the final analysis, to the manufacturer."

Exclusive Distributer

Recently opened in San Francisco, Calif., was a new automotive service station of the Johnny Crowe Co. which has been named exclusive distributer for Fisk in San Francisco. One of the unique display features of the new station is a Neon sign, first of its kind in the United States, showing Fisk's sleepy boy, again being advertised from coast to coast on billboards. The new

station cost $30,000, has $20,000 worth of equipment and an inventory of $25,000. Total business for the opening day grossed approximately $11,000.

Among those taking part in the ceremony were Mr. Crowe; Dan Messinger, his general manager; C. C. Combellack, San Francisco branch manager of the Fisk Tire Co.; and W. B. Smith, trade sales manager of the Fisk home office.

The Board of Governors of the Employes' Association of United States Rubber Products, Inc., Bristol, R. I., recently held its annual election in the recreation hall at the plant, when the following were named: Henry Miranda, Louis De Felice, Paul Bruno, Manuel Varges, Mary Soldano, Josephine Velleca, Winston Fetherston, Michael W. Pasquarelli, Gladys Rishe, James Sisson, and Louis Dickenson. A specialty dance social, attended by about 200 persons, followed the business session.

The Collyer Insulated Wire Co. purchased a tract of land on Roosevelt Ave., adjacent to the plant of the concern in Central Falls. It was explained that no new buildings are contemplated at present, but that the property was purchased for possible future expansion. At present it will be used as an automobile parking space for the company and its employes.

NEW JERSEY

(Continued from page 80)

Puritan Rubber Co., Trenton, is taking advantage of the slump in trade to make a number of improvements and alterations in its power plant.

Mercer Rubber Co., Hamilton Square, reports improved business in all departments. The company feels that business will now continue to improve.

Johnson & Johnson, Inc., New Brunswick, has announced the resignation of Robert Wood Johnson as president, to devote his full time to the chairmanship of the board of directors. His successor to the presidency is Arthur R. Clapham, formerly vice president and general sales manager.

Essex Rubber Co., Trenton, finds business holding up satisfactorily, and further improvement is expected soon.

Pocono Co., Trenton, announced business is declining steadily.

U. S. Industrial Alcohol Co., 60 E. 42nd St., New York, N. Y., has announced that as part of its general program of expansion in the chemical field, it has taken over, as of May 1, the business formerly conducted by Robert Rauh, Inc., 480 Frelinghuysen Ave., Newark, N. J., manufacturer of synthetic resins.

CANADA

Rubber Industry Statistics

Years	Production Value	Cost of Materials	Wages and Salaries	Production Minus Materials and Wages
	Thousands of Dollars			
1928	$97,209	$45,119	$18,244	$33,146
1929	96,935	42,941	20,135	33,859
1930	73,753	28,822	15,895	29,036
1931	52,691	17,630	11,708	23,953
1932	40,747	11,907	9,341	19,499
1933	41,512	12,915	8,910	19,687
1934	55,230	18,439	10,859	25,932
1935	55,950	20,259	11,017	24,674
1936	62,055	23,599	11,954	26,502

Financial statistics on the Canadian rubber industry from 1928 to 1936 inclusive, based on the 1936 census, were recently reported by the United States Bureau of Foreign and Domestic Commerce. The above table summarizes the data on production and costs.

From these figures it is seen that wages and salaries have represented a fairly constant percentage (22.9 to 19.3) of the value of production. Material costs, however, have varied between 46.4 and 29.3% of the production value. Such fluctuations within so short a period are almost unprecedented.

In 1929 the capital invested in the industry was reported at $73,880,000; thus the production value represented a capital turnover of 1.31 for the year. Although capital investment was down to below $66,000,000 in 1932 and 1933, the heavy decline in production value for those years left capital turnover below 0.64 for each year. In 1936, with investment at $64,600,000, the turnover was 0.96.

Increased Use of Reclaim and Latex

The table below, based on United States Bureau of Foreign and Domestic Commerce figures, shows the marked increase in the use of reclaim by Canadian rubber manufacturers in recent years.

RUBBER CONSUMPTION IN CANADA
(Pounds)

Year	Crude Rubber	Reclaim	% Reclaim to Crude	Average Cost of Crude (Canada)
1934..	60,713,104	8,484,392	13.97	9 ¢
1935..	59,897,660	10 478,433	17.49	11½¢
1936..	63,585,719	13,708,007	21.57	14¼¢

Consumption of latex in 1934 was reported at 30,625 gallons, in 1935 at 69,455 gallons, and in 1936 at 155,788 gallons, more than doubling during each year.

Ontario Urges Motoring Safety

Enthusiastically commending the current campaign of highway safety being sponsored by Hon. T. B. McQuesten, Ontario minister of highways, the Industrial Accident Prevention Associations last month made a cooperative contribution in furthering the move to reduce motor accidents and deaths.

According to R. B. Morley, I.A.P.A. general manager, his organization is distributing 25,000 copies of a safety booklet entitled "Many Happy Returns —And How to Enjoy Them." These pamphlets will be distributed to employers and employes of more than 5,000 industrial plants throughout Ontario.

Tariff Change

Under a new tariff item (No. 828), effective from February 26 to July 30, 1938, trucks of welded design with tubular frame, cast steel cross members, rubber mountings, and rubber inserted wheels, of a class or kind not made in Canada, for use in the construction of street railway cars (not to include electric motors or magnetic track brakes), and complete parts, may enter Canada free of duty under the British preferential and intermediate tariffs, according to a report of March 1 from the office of the American Commercial Attaché, Ottawa.

The above concession applies to imports from the United States, which ordinarily would be subject to the rate of 30% ad valorem under item 434a.

Vistanex

(Continued from page 70)

largely upon the molecular weight. When Vistanex Medium, one of the drier grades, is substituted for substantial amounts of rubber, the resulting product is said to have: (1) better aging characteristics; (2) better ozone and oxidation resistance; (3) improved electrical characteristics; (4) decreased swelling in many organic solvents; (5) decreased swelling in most vegetable and animal oils; (6) greatly improved resistance to strong acids and corrosive solutions generally; and (7) lower water absorption. These characteristics of Vistanex-rubber blends suggests the use of Vistanex in superaging compounds and compounds for such purposes as acid resistant articles, electrical insulation, fabric proofing, and laminating materials.

Rubber Industry in Europe

GREAT BRITAIN

Rubber Industry Statistics

A timely article on the statistics of the rubber industry was read by G. Rae, of Harrisons & Crosfield, Ltd., before a recent meeting of the Royal Statistical Society. According to Mr. Rae,[1] the total area of plantation rubber at the end of 1936 was about 8,500,000 acres, of which 53% was on estates and 47% on native holdings. Budded rubber is confined almost exclusively to estates, representing less than 20% of the estate acreage and less than 10% of the total rubber acreage.

To open up, develop, and equip an estate with buildings and machinery has cost on an average £55 to £60 per acre, and this work probably could not be done for less today. This amount does not allow anything for the seven or eight years which must elapse until the estate normally reaches the profit-bearing stage. An average fair cost of production on estates in Malaya during the second half of 1937, when exportable was 90%, was between 6d. and 6½d. per pound. This figure includes an allowance of almost 1d. per lb. for amortization of mature areas, an allowance which Mr. Rae stresses is absolutely necessary.

Absorption

Turning to consumption, the author shows that adequate absorption data are available only for the United States and since 1935 for the United Kingdom. Nor are complete and reliable data for stocks available for other consuming countries. While about 75% of America's annual absorption has in recent years gone into tires, the proportion for the other countries probably works out at 60%. Incidentally the proportion of trucks and busses to total automobile registration is nearly twice as high in other countries as in the United States. Discussing the improved quality of tires and the increased mileage obtained today, Mr. Rae points to the larger amount of rubber used in tires and tubes since 1928 as a factor. This increase averaged 60% in 1936 as against 1928. Although a major portion of the rubber produced goes into tires, the world absorption in other goods has risen from about 40,000 tons in 1910 to about 350,000 in 1937, an increase largely due to the development of new uses.

Rubber is chiefly dependent on motor transport, which in turn is influenced by prosperity, hence the susceptibility of rubber to trade fluctuations. According to Mr. Rae, the United States is the weak spot in this connection. During the depression, he says, the decrease in annual absorption of crude rubber has taken place entirely in the United States and then mainly in rubber used in automobiles.

Stocks

When he comes to stocks, Mr. Rae says that the question as to what constitutes normal stocks has often been discussed, but it does not admit of a satisfactory solution, and past experience is no help here. He shows that of the five strong upward movements in price which have taken place since 1919, in four the fundamental cause of the rise was the general belief that a real shortage of rubber was imminent. On each of these occasions the market under-estimated future supplies and over-estimated future absorption; and the market is far more influenced by future prospects than by current stocks. So it seems impossible to fix a definite ratio of stocks to absorption and to call that ratio a normal stock, if by normal stock is meant such a stock as would prevent undue fluctuations in price and at the same time maintain the price at a reasonable level. The effect on price of the current level of stocks cannot be considered apart from future prospects.

As to suggestions regarding the creation of a buffer stock, he is of opinion that this would prove more harmful than helpful to the industry.

Treating of the various schemes for regulating rubber supplies during the past 20 years, Mr. Rae states that the present scheme was about as flexible as it was possible to make it. But no scheme, he adds, however flexible on paper, can, in practice, immediately adjust supplies to sudden and unexpected variations in absorption of the magnitude experienced in 1937.

[1] *Bull. Rubber Growers' Assocn.*, Mar., 1938.

Institution of the Rubber Industry

The sixteenth annual general meeting of the Institution of the Rubber Industry was held in London on April 25, when S. T. Rowe was reelected president for 1937-1938. At the same time the following were elected vice presidents: F. D. Ascoli, Sir George Beharrell, Sir Herbert E. Blain, J. R. Cadge, Col. J. Sealy Clarke, Hugh C. Coles, Lord Colwyn, Alexander Johnston, Eric Macfadyen, H. Eric Miller, H. G. Montgomery, Dr. S. S. Pickles, B. D. Porritt, Herbert Rogers, Dr. P. Schidrowitz, Sir Walrond Sinclair, A. E. Tanner, Dr. D. F. Twiss, and D. F. L. Zorn.

This year the Colwyn Gold Medal was awarded to B. D. Porritt, director of the Research Association of British Rubber Manufacturers, for valuable services in connection with research for the industry.

Rubber Publicity Society

The British Rubber Publicity Association was recently formed to adopt an agreement with the Rubber Growers' Association, Inc., to disseminate information regarding rubber and rubber products, to print and publish books and other literary matter on the rubber industry, to promote the products of rubber and latex, etc. The company, limited by guarantee without share capital, is under the management of a board whose first members are James Fairbairn, Francis E. Maguire, Alfred C. Matthew, Edward Jago, and Frank Smith.

New Dunlop Products

The Dunlop Rubber Co. has just put on the market a rubber material for soles and heels which has the finish of leather and the durability of rubber. The material, supplied in black and tan, can be used for manufacturing purposes or in repairing. This concern now also supplies "socks," or rather insoles, of Dunlopillo in sizes for men and women. Made from grey Dunlopillo material, the "socks" are about ⅛-inch thick and compress to half that. They are claimed to be both comfortable and hygienic; the alternate compression and expansion of the material at each step insures constant ventilation.

NORWAY

Norway's foreign trade in rubber increased in practically all items of both imports and exports in 1937. Consumption of crude rubber, gutta percha, and balata rose to 2,096 tons from 1,581 tons in 1936. Imports of automobile tires were 582 against 524 tons; thread, packing, etc., 1,098 against 876 tons; rubber-soled footwear, 133 against 119 tons; rubber shoes, 148 against 111 tons. Among the chief exports were footwear, 189 against 169 tons, and belting, 252 against 228 tons.

GERMANY

The Rubber Industry under Hitler

Year	Tires		Other Rubber Goods		Totals	
	Quintals	Marks	Quintals	Marks	Quintals	Marks
1933	28,272	7,125,000	114,270	40,353,000	142,542	47,478,000
1934	36,466	8,065,000	97,179	33,702,000	133,645	41,767,000
1935	43,296	8,116,000	100,444	31,702,000	143,740	39,818,000
1936	57,286	8,903,000	114,487	32,660,000	171,773	41,563,000
1937	63,826	10,118,000	132,054	39,044,000	195,880	49,162,000

An interesting review of what the Hitler Government has done for the rubber industry in Germany appears in a recent issue of the *Gummi-Zeitung*. The author gives details concerning the organization of the industry, the different associations, the unions regulating the marketing of different rubber goods, and the various measures passed by the government to control the industry with a view to carrying out the four-year plan. The article concludes with a brief survey of the development of the rubber industry since 1933, from which came the following data:

The number of employes in the industry rose from about 45,000 persons in the middle of 1933 to about 60,000 in the middle of 1937. Crude rubber consumption increased from about 55,000 tons to almost 100,000 tons in the period 1933-1937. Rubber goods, estimated to have represented a value of 600,000,000 marks, were taken up by the domestic markets in 1937, which is about 2½ times as much as for 1933. To some extent the higher value is due to the rise in prices necessitated by the excessive duty on crude rubber, but even when allowance is made for this, the final figure for 1937 is more than double that of 1933.

The various measures which foreign countries have taken to curb imports have naturally affected German exports so that the rate of increase here has lagged considerably behind that for home sales. The table above shows the trend of German exports of rubber goods during the five years 1933-1937.

It will be noted that only tire exports advanced steadily, whereas exports of other rubber goods fell steeply after 1933, and although the quantity again increased and finally exceeded the 1933 figure, the value has not caught up yet.

Meetings and Exhibitions

Because of the many conferences scheduled for the early part of this summer, the Deutsche Kautschuk Gesellschaft has decided to hold its meeting early in the fall, some time during September, and probably in Hamburg.

The Achema IX, Chemical Plant Exhibition, is to be held in June, 1940, in Frankfurt a.M. on the occasion of the National Meeting of German Chemists. The Second International Congress of Chemists and Engineers will take place in Germany in 1940 as a part of the World Congress and in connection with the Achema IX. The first of these congresses was held in London in 1936. The International Congress for Testing Materials, the World Petroleum Congress, and the International Gas Congress will also be held in Germany about the same time.

Company News

The Hanauer Gummischuhfabrik Westheimer & Co., Hanau, formerly owned by Lowengart and Stern, who have now retired, has been converted into a joint stock company with a capital of 1,700,000 marks and will be known as Hanauer Gummischuhfabrik A.G.

Tretorn & Calmon Gummiwerk A.G., Hamburg, reported for 1937 a profit of 365,192 marks, against a loss of 174,886 marks in 1936. During the past business year the company spent 164,883 marks on welfare work both for general purposes and for its own staff. A 6% dividend was proposed.

Profits of Kölnische Gummifaden-Fabrik vorm. Ferd. Kohlstadt & Co., fell from 113,346 marks in 1936 to 43,036 marks in 1937. This drop was ascribed to the higher prices for crude rubber prevailing last year. In 1935 the firm showed a loss of 46,191 marks. The 1937 balance added to the carry-forward from 1936 brings the total profit to 80,191 marks, out of which a 5% dividend is to be paid.

Reclaimers Restricted

On April 19, 1938, the government issued an order which forbids the establishment of new enterprises for reclaiming or otherwise working up old rubber and waste without special permission. The prohibition also extends to the expansion of similar already existing works and the reopening of establishments that had been closed longer than six months on the date of the order.

HOLLAND

An anti-seasickness apparatus, said to be very effective, is described in the first number of "Rubber," the organ of the "Rubber Stichting," Amsterdam, Holland. The device, designed by Dr. G. P. Utermohlen, medical adviser of the steamship company "Nederland," consists of a head-rest suspended from a metal frame by means of spiral springs and is fitted with a sponge rubber cushion. Dr. Utermohlen found that sea-sickness is prevented if the patient lies down and is able to keep his head in a horizontal position when the ship is rolling, and if, when the ship pitches, head movements can be moderated. His specially constructed apparatus together with the sponge rubber cushion helps achieve these ends. More recently the apparatus has found wider application; physicians are recommending its use in the transportation of the sick and wounded both in times of peace and war. In several hospitals in Holland a slightly modified form is being tested with a view to its regular use in special cases where absolute repose and a comfortable position of the head are essential.

CZECHOSLOVAKIA

Czechoslovakia considerably increased her rubber business during 1937 as compared with 1936. Crude rubber imports rose from 101,080 to 180,710 quintals, and both imports and exports of manufactured rubber goods showed substantial gains over the preceding year. Thus imports of rubber footwear were 3,306,000 kronen, against 1,126,000 kronen; cycle tubes, 12,116, against 9,551 units; cycle covers, 20,906 against 16,224 units; other tires remained practically unchanged at 14,389 units, and other tubes were almost the same as in the preceding year, namely, 7,004 units. Exports of all kinds of rubber footwear, chiefly rubber-soled canvas shoes, soared from a value of 40,146,000 kronen to 74,243,000 kronen; exports of cycle tubes fell from 41,773 to 37,408 units, but covers were more than double at 61,982, against 27,164 units; other tubes for vehicles were 44,896 against 26,071 units; and other tires, 50,266 against 21,880 units.

GREECE

Import restrictions coupled with increased domestic demand for various types of rubber goods have caused a practical boom in the Greek rubber manufacturing industry. This is reflected in the greatly increased consumption of crude rubber, 720 tons in 1937 against 311 tons in 1936. The production of rubber footwear in particular appears to have expanded greatly, and the stage has now been reached where not only is the entire home demand covered, but the export of footwear is also being contemplated. One company is also said to be planning the manufacture of gas masks for the Greek army under foreign license.

Rubber Industry in Far East

INDO-CHINA

Buddings Defended

Much information appears in an article[1] on "Plantations from Selected Hevea Seed," by M. Bocquet, technical director of the Societe des Terres Rouges. It appears that many planters in Indo-China, as in Malaya, have been disappointed in their buddings and have suddenly turned to selected seed instead. M. Bocquet replies to the criticisms leveled against buddings and compares them with selected seed in order to save the planters from new disappointment resulting from their latest enthusiasm.

In reply to the criticism that buddings are not strong, he says that this is not extraordinary; for as selection advances it becomes normal to find more delicate trees. However notable exceptions appear; Avros 49 and Avros 50 as well as Bodjang Datar 10, for instance, are as resistant to disease as ordinary seedlings. Furthermore the weakness of some clones can be overcome by closer planting and greater care.

The comparatively low outputs from clones in the early tapping years are another cause for complaint; it frequently happens that the early results are below those even of seedlings of about the same age. This condition is due to the fact, explains M. Bocquet, that buddings now in production in Indo-China rarely constitute normal plantations—either they were planted too far apart to begin with and had to be doubled later on, or the first clones used were not the best, or, finally, budding was carried out under unfavorable conditions. Again, buddings reach full production later than seedlings so that high outputs are not to be expected until the trees have been in tapping five to six years, that is normally ten to twelve years after budgrafting. At any rate the outputs of Indo-China buddings appear to have been increasing for the last three years.

The rubber from the latex of clones, it is further claimed, is of inferior quality. M. Bocquet's reply to this statement is that it is hard to make good commercial rubber from the latex of young trees whether they are budded or not.

Outputs

Concerning outputs of buddings in general, the author points out that hitherto results published by British or Dutch planters have not permitted an insight into probable results from commercial tapping or buddings, as the yields given are usually per tree or from very small areas. However he refers to the very interesting results of a recent questionnaire on yields from buddings sent out by the AVROS, of Sumatra.

The replies received concern only monoclone areas of at least 25 hectares, in production in 1936 and normally planted between 1925 and 1930. Replies received covered over 6,000 hectares, and it was possible to plot a yield curve according to age. This curve shows output of about 1,200 kilos per hectare in the twelfth year, at which age it seems full productivity is reached. The clones are all old AVROS clones, from AV 33 to AV 256. These results, of course, were obtained from well-kept estates. While some Indo-China estates may hope for still better results from the latest clones, others again will not even attain these because of neglect on estates or because the climate is unsuitable for some of the clones.

Types of Selected Seed

M. Bocquet next discusses the different types of selected seed: first are the legitimate seeds from artificial cross pollination and from artificial self-pollination. In Indo-China, 10 to 25% of successes are obtained by the first method; only a very small percentage of successes are reported by the second method. On the estates of the Terres Rouges concern, for instance, 61,000 nursery plants were finally developed from 440,000 crosses, or 14%; but less than 1% of successes was obtained from 9,500 self-pollinations. Incidentally, Terres Rouges now has about 100,000 plants in nurseries and field from crosses.

Then come the illegitimate seeds. These also fall into two categories, one in which the male parent is quite unknown, as, for instance, when clones are interplanted with ordinary seedlings and the pollen probably came from the latter; the other, so-called clonal seed obtained from blocks of single or mixed clones not isolated from the rest of the plantation, and of which the parentage is not certainly known.

Finally are the isolated seed gardens where one or more proved clones are planted in forest clearings at some distance from the rest of the plantation. M. Bocquet discusses the comparative value of the different types of seed; he seems to favor legitimate seeds from cross pollinations over seeds from isolated gardens, especially as artificial cross-pollination is relatively easy in Indo-China and does not appear very expensive. Experiments in Sumatra indicate that clonal seed has a definite value in supplying superior stocks; buddings made on certain of these have yielded considerably higher outputs than when budded on ordinary stock.

Comparison of Clones and Seedlings

While admitting the physical weakness of buddings, M. Bocquet points out that trees from selected seed, although more natural products than buddings, nevertheless are also probably weak in comparison with ordinary seedlings. In summing up the comparative value of generative and vegetative reproduction, he shows that not only does generative selection present certain difficulties, but that the products are of very unequal value. The best families resulting from crossings of good clones are equal in value to those clones; the illegitimate offspring of good clones rarely equal the clones themselves, but some clones have excellent illegitimate offspring. Exceptional individuals are sometimes obtained from both crossings and buddings, and these are frequently superior to the best proved clones.

Buddings continue to be the best material for planting, especially as the work on stocks indicates that yields can be improved by the use of suitable stock, and they will continue to be the best material because new exceptional individuals, whether the offspring of budding or crossing, are constantly being discovered, and from these, new proved clones are developed. Buddings will not disappear until selection has advanced to the stage where only small differences are found in the productive capacity of progeny.

M. Bocquet concludes by recalling that the leading institutes in the Far East concur in recommending that at present a planter may use 20 to 50% of selected material, while the remainder should be buddings.

Crude Rubber Exports

Indo-China exported 44,095,323 kilos of rubber during 1937, including 7,144 kilos of latex. The 1937 total was only 2,609,855 kilos greater than that for 1936.

Incidentally, 113,269 kilos of rubber, including 789.5 kilos of latex, were consumed locally.

[1] *Bull. Synd. Planteurs Caoutchouc l'Indo-chine, Dec.,* 1937.

MALAYA

Tapping Holiday Proposed

Rubber dealers in Singapore and prominent people on the producing side are seriously considering a proposal that all large estates in Malaya and Netherland India cease tapping rubber for one month, the *Straits Times* learns. It is claimed that the recent fall in prices is purely psychological. Estimates of consumption for the second quarter are put at 230,000 tons, and a 60% quota will produce 201,000 tons. Hence the decline to the low levels experienced toward the end of March was entirely unwarranted. It is difficult, however, to eradicate this slump complex, the paper continues, and it is maintained that an entire month's cessation of tapping would play a large part in restoring price to remunerative levels without, in fact, reducing supply, which would be merely postponed.

A precedent exists for the proposed holiday—in 1931 in order to reduce supplies and without the aid of a regulation scheme, tapping was suspended with satisfactory results to producers.

It has been suggested that complete cessation of tapping would cause some disorganization of labor on estates, but even if it did, it is argued, the rise in price would more than compensate for such disorganization. Tapping systems can always be modified, and no estate management can afford to allow considerations of tapping systems to overcome the more important consideration of price.

It is suggested that this proposal be considered by planting associations and that the government should be approached with a view to obtaining the cooperation of large estates in Netherland India.

Pivotal Price for Rubber Suggested

At the annual meeting of the Singapore Chamber of Commerce Rubber Association, the chairman, Mr. Hare, said that the fixing of a pivotal price for rubber by the International Rubber Regulation Committee was highly desirable. If the committee stated definitely the price at which it was aiming, this action would contribute much toward stopping wide price fluctuations.

Chermang Development Begins Tapping

One of the most interesting estates in Malaya has just reached the tapping stage. This is the Lanchang Estate of Chermang Development, Ltd., a company formed in 1930 by several other Malayan rubber growing concerns who, lacking facilities or suitable reserve land for growing budded rubber, jointly provided the capital for this enterprise, devoted exclusively to budded rubber. The company acquired about 3,645 acres of jungle land in Pahang; of this about 1,500 acres have been planted with up-to-date budded material. The area that has now reached maturity covers 1,000 acres, but only selected trees have been tapped to begin with, partly because the estate is not yet fully equipped for manufacture, but chiefly because it is considered more advantageous to wait until the trees attain a larger girth.

Tapping was started the end of December, 1937, on about 200 acres; it is expected that by the end of the current year tapping on a commercial scale will be in full swing. The assessment of standard production for 1938 comes to 484,878 pounds on 1,027 acres, or an average of 526 pounds an acre on the 1930-1931 plantings, and 390 pounds an acre on the 1931-1932 planting.

It is estimated that when factory, housing, and equipment have been completed and paid for, the final cost per acre will work at around £50.

NETHERLAND INDIA

The importance of suitable stocks for the health and productivity of buddings was stressed in a lecture on the reciprocal influence of the upper and lower stems in Hevea buddings, by Dr. J. Schweizer, at a meeting of the Besoeki planters recently held at Djember. During the last few years investigators have found that the output of a budding can be favorably influenced by the growing and flowing powers of the stock; at the same time, however, it has become evident that there must be another factor involved in addition to the above two. According to Dr. Schweizer, this factor includes, among others, the direct communication of latex vessels in the two stems, besides a far-reaching and ready transportation of substances to other parts of the bark besides the latex vessels.

He showed how a series of latex vessels of a budding passed from the lower to the upper stem in a continuous fashion over an area 50 cms. above the union and 50 cms. below the union and that the yields from the area near the union are considerably influenced by the number of communicating latex vessels present.

Dr. Schweizer pointed out that it has been found that the area collaborating in the production of latex at a low cut is much greater than has hitherto been supposed; indeed this area may extend as far down as one to two meters on the tap root. A definite relation has been established between this fact, the extent of communication between latex vessels above and below the union and the incidence of brown bast.

When no direct communication exists between latex vessels, no latex can flow from the stock to the low cut on the budding; production decreases, and at the same time the tissues of the stock are overloaded, eventually leading to disease. This is further borne out by the fact that it has frequently been observed that brown bast is more prevalent near the union. The stock thus plays a very important part in the productivity of buddings, and the value of suitable stock lies not so much in any direct increase in output that the right combination of stock and scion may bring about as in the fact that thereby the incidence of brown bast is reduced and production is thus maintained at its proper level.

These findings indicate a new line of investigation to discover the right type of seedlings to serve as stock for valuable buddings; definite progress appears to have been made in this direction in Java already. On the estate Klatakan (Mij. Oud-Djember) an experiment to test stocks, the first of its kind, it is said, has been running for five years; here some buds have been grafted on to stocks derived from the same clone and others on to unrelated stocks; the former have in each of the last five years yielded respectively 13%, 22%, 18%, 8%, and 20% more than the latter.

Incidentally it has been found that the effect of the stock on the scion is the greater the further away the cut is from the union; it is least marked at the union. This, it is thought, may possibly have some connection with colloidal-chemical reactions between the two different latices.

U. S. S. R.

Russian imports of crude rubber declined slightly during 1937 as against 1936, 30,951 and 31,491 tons respectively. But exports of rubber goods, although still relatively small, advanced sharply from 364 metric tons, value 1,037,000 rubles to 942 metric tons, value 4,482,000 rubles.

POLAND

Rumors are again afloat about a synthetic rubber to be produced in Poland. Some time ago it was said that a product named Ker had been evolved. Now it appears that the Stomil concern is to exploit a new process using alcohol from potatoes.

DENMARK

General rubber goods, tires for motor vehicles and cycles, surgical and sanitary goods, and hospital supplies are among the items that will be displayed at the international sample fair scheduled for June in Copenhagen, Denmark. The fair is being held in connection with the celebration of the twenty-fifth anniversary of the metal section of the Association of Representatives of Foreign Firms.

Editor's Book Table

NEW PUBLICATIONS

"Neville 465 Resin. Varnish Making Technique." The Neville Co., Pittsburgh, Pa. Data sheets, available only to bona fide coatings manufacturers, contain technical suggestions for cooking varnishes that use Neville 465 Resin (described in INDIA RUBBER WORLD, April, 1938, page 54). Type formulae with recommended cooking procedures and resulting film characteristics are included.

"The Vanderbilt News." May-June, 1938. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 42 pages. This issue is concerned chiefly with a comparison of the properties, functions, etc., of the eight Age-Rite antioxidants, Alba, Excel, Gel, Hipar, Powder, Resin, Resin D, and White. A comparative table is furnished. Physical tests results are given which indicate the comparative effectiveness of these antioxidants when used in compounds of the following types: pure gum, tread, white sidewall, mechanical, and wire insulation. Pages 34 to 42 include graphs, formulas, and a discussion of secondary antioxidants.

"Signs of the Times." Roy A. Foulke, analyst, Dun & Bradstreet, Inc., 290 Broadway, New York, N. Y. 43 pages. This pamphlet is supplementary to the author's 1937 edition of "Behind the Scenes of Business." It is a compilation of the 14 important balance sheet and operating ratios for 63 lines of business activity, from the years 1932 through 1936. The results were determined from a study of the 1936 figures of 11,775 business enterprises—wholesalers, manufacturers and retailers—having a tangible net worth in excess of $50,000. While no data on rubber are given, the ratios indicate operating results in business in general.

"Rigid Wage Rates and Costs." Allen W. Rucker, in collaboration with N. W. Pickering, president, Farrel-Birmingham Co., Inc., Ansonia, Conn. 15 pages. In this pamphlet, No. 26 in a series of booklet-editorials, the authors attack the theory that purchasing power is directly dependent upon the wage rate. It is their contention that the governmentally inspired tinkering with the wage rates caused a drop in factory output with a resultant increase in unemployment.

They claim that business recovery based upon a reduction of industrial costs and prices cannot begin until there is a substantial reduction in wage rates.

"Vistanex." Advance Solvents & Chemical Corp., 245 Fifth Ave., New York, N. Y. 44 pages. This booklet covers the composition, properties, and application of Vistanex, originally produced by I. G. Farbenindustrie A.G. in Germany under the name of "Oppanol." The larger part of the publication is devoted to rubber-Vistanex compounds, with graphs indicating the effect on the physical properties by substituting Vistanex for rubber in increasing amounts. The book is made loose-leaf in form with the intention of periodically publishing supplementary data sheets as development on Vistanex continues.

"Shoe Constructions." Circular C419, National Bureau of Standards, United States Department of Commerce, Washington, D. C. 14 pages. Illustrated. This circular contains brief descriptions of 40 individual shoe constructions and discusses their classification under eight main classes: welt, McKay, Littleway, turn, stitchdown, nailed, cemented, and moccasin. An analysis of shoe production figures for 1935 is included, which indicates the importance of each class of construction in relation to the total number of shoes manufactured. The circular also discusses the value to the consumer of marking shoes to show the types of construction and touches upon the subject of their performance, showing a photograph of a wear test machine which simulates conditions in actual usage.

"Bonded Built-Up Roofs." Johns-Manville Corp., 22 E. 40th St., New York, N. Y. 36 pages. Illustrated. This book includes information on the latest types of built-up roofing and contains more than 40 completed detailed specifications on J-M built-up roofs. The subject of roof insulation is discussed in detail, and various methods of base and cap flashing are given, together with diagrams which show how flashing should be installed. There is a detailed explanation of the various types of roofing materials and the qualities which determine their ability to stand up under fire, weather, and wear.

"News about du Pont Rubber Chemicals." E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Included with the letter was a report, "The Limitations of Rubber. IV—Flame Proofing," by Carl S. Williams, which compares the relative flame resistance of rubber and Neoprene and discusses the use of the various materials suggested in the literature as flame retardants.

"Rubber Plantation Machinery." Francis Shaw & Co., Ltd., Manchester, England. Eight pages. Illustrated. This leaflet describes, with specifications, the firm's line of rubber plantation machinery, including several types of washing machines, scrap washers, and sheeting machines.

"Millivoltmeter Pyrometers." The Bristol Co., Waterbury, Conn. This 12-page illustrated bulletin gives information regarding the construction and operation of Bristol's millivoltmeter pyrometers in all models. Data concerning the available ranges and drilling dimensions are also included. Several scales are reproduced in actual size.

"'Techni' Rolls." Mackintosh-Hemphill Co., Pittsburgh, Pa. 4 pages. This folder announces a new process in metallurgical control which can be applied to all types of iron and steel rolls. The "Techni" process is said to produce rolls which have finer-grained necks and bodies, denser chills, and respond excellently to heat. This process is said to regulate the quality and grain size of iron rolls with as much exactness as the best modern steel practice regulates these qualities in steel.

"Condor Whipcord V-Belts." Bulletin No. 6868. The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. This four-page bulletin describes technical details of the functions and construction of the V-belt in a form that will be understandable by the layman. Several photographs of Condor V-Belt installations as well as list prices and a V-belt comparison table are included.

"Mechanical Rubber Goods." Goodyear Tire & Rubber Co., Inc., Akron, O. 56 pages. Illustrated. This catalog lists Goodyear's mechanical goods products, giving complete information and specifications about various types of belting, hose, railroad goods, sheet packing, wringer rolls, molded and lathe cut goods, printers' supplies, and industrial rubber rollers.

"Oak Hytex Toy Balloons." The Oak Rubber Co., Ravenna, Ohio. 48 pages. This color-illustrated catalog describes the company's complete line of toy balloons. Manufactured by a patented Anode process from liquid latex, these balloons are offered in a wide variety of styles and colors, including "prints" of Walt Disney's popular characters on round, airship, and novelty models.

BOOK REVIEWS

"The Chemistry and Technology of Rubber Latex." C. Falconer Flint. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 1938. Cloth, 6 by 9 inches, 715 pages. 147 illustrations. Subject and Author indexes. Price $14.

This book is based on a translation of Georges Génin's "Chemie et Technologie du Latex de Caoutchouc," which appeared in 1934. In view of the rapid progress made in latex technology since 1934, Mr. Flint has found it necessary to amplify and revise the text matter considerably in order to bring the book up-to-date. In addition, with a large amount of practical information on latex compounding incorporated in the text, the value of the book as a working tool for the latex technologist has been materially increased.

In this comprehensive treatise the author has covered all aspects of the subject from plantation control to the manufactured product, stressing the technological rather than the chemical point of view. The chemical treatment is limited to the requirements of the latex technologist, and thus the subject matter has not become overburdened with theoretical discussion.

The completeness of the work is indicated by the headings of its twelve chapters: Historical; The Source of Rubber Latex; Composition and Properties of Latex; Coagulation of Latex and Preparation of Rubber; The Preservation, Shipping and Concentration of Latex; The Compounding and Vulcanization of Rubber by Latex Processes; Manufacture of Dipped Goods from Latex; Electro-Deposition of Rubber in Latex; Impregnation of Fibres and Fabrics—Latex in the Textile Industry; Various Applications of Rubber Latex; Physical Testing of Latex Rubber; and Artificial Dispersions of Rubber.

"Physical Chemistry." J. N. Brönsted. Translated from the Danish by R. P. Bell. The Chemical Publishing Co. of N. Y., Inc., (exclusive agents in North and South America for this book) 148 Lafayette St., New York, N. Y. 1938. Cloth, 5¼ by 8½ inches, 394 pages. Index. Price $5.

This excellent translation of Professor Brönsted's textbook, originally published in 1936, brings to the English student the more important advances made by the Danish in physical chemistry. The unique feature of this work is in its method of presentation, with special emphasis being laid on the thermodynamic foundation of physicochemical laws. In the author's opinion this is the easiest way of attaining the desired combination of simplicity and rigor. In addition, the subject matter is also dealt with from the aspects of kinetic and molecular theory, this being partly interpolated in the thermodynamic treatment.

The book is divided into eleven chapters with the following headings: The Laws of Thermodynamics; States of Aggregation; Molecular Theory; Mixtures; The Theory of Dilute Solutions; Homogeneous Equilibria; Electrolytes; Reaction Kinetics; Electrochemistry; Affinity; and Surface and Colloid Chemistry.

"DeVilbiss Spray-Painting and Finishing System." Catalog "ID." The DeVilbiss Co., Toledo, O. 28 pages. This new illustrated catalog lists specifications of the company's line of industrial finishing and spray-painting equipment. This includes spray-guns, feed tanks and equipment, special containers, air and fluid hose and connections, spray booths and exhaust systems, air compressing outfits, and other related necessities. Special guns for latex, lacquers, and other materials are described. Copies of this catalog are furnished on request.

RUBBER BIBLIOGRAPHY

Velocity of Combination of Caoutchouc with Sulphur during Vulcanization. Z. Karpinski, *Przemyst. Chem.*, 22, 8-12, (1938).

Force-Extension Curves and Anomalies in the Solidity of Rubber. H. Hintenberger and W. Neumann, *Naturwiss.*, 26, 13, (1938).

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Rubber: What of the Shareholder? R. H. Wright, *Rubber Age (London)*, May, 1938, pp. 66-67.

Discussing Idle Machine Times. D. Ward-Benson, *Rubber Age (London)*, May, 1938, p. 68.

Thermo-Element and Resistance Thermometer in Rubber Investigations. *Rubber Age (London)*, May, 1938, pp. 69-70.

Latex in the Rubber Industry. H. J. Stern, *Rubber Age (London)*, May, 1938, p. 75, pp. 77-79. (Conclusion.)

Finishes for Electrical Ebonite. E. E. Halls, *India Rubber J.*, Apr. 16, 1938, pp. 5-7, p. 12.

Manometer for Measuring the Oxidizability of Rubber. C. Dufraisse, *Rubber Chem. Tech.*, Apr., 1938, pp. 268-81.

Influence of the Temperature on the Crystallization of Rubber. H. Dostal, *Rubber Chem. Tech.*, Apr., 1938, pp. 348-49.

Isomerization of Rubber. C. Ferri, *Rubber Chem. Tech.*, Apr., 1938, pp. 350-51.

An X-Ray Study of Stretched Rubber. H. A. Morss, Jr., *Rubber Chem. Tech.*, Apr., 1938, pp. 352-58.

Investigation of the Thermal Conductivity of Rubber. L. Frumkin and Y. Dubinker, *Rubber Chem. Tech.*, Apr., 1938, pp. 359-71.

Processing of Plastic Masses and Their Properties. E. Pallas, *Gummi-Ztg.*, 52, 219-22, (1938).

Chemical Detection of Synthetic Resins Used in Varnishes. H. Wagner and H. Schirmer, *Farben-Ztg.*, 43, 131-33, 157-58, (1938).

Effect of Cleaning Solvent and Printing Ink Vehicle on Offset Rubber Blankets. M. Ogura and K. Nakazima, *Res. Bull. Govt. Printing Bur.*, Tokyo, 3, 21-36, (1937).

Influence of Addition of Rubber on Properties of Bitumen. J. G. Fol and J. A. Plaizier, *Wegen*, 13, 201-11, (1937).

History and Importance of Vulcanization Accelerators. M. Bögemann, *Angew. Chem.*, 51, 113-15, (1938).

New Method for the Direct Determination of Rubber. A Preliminary Communication. E. Kheraskova and E. Korsunskaya, *Rubber Chem. Tech.*, Apr., 1938, p. 438.

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Rubber in Automobiles. C. Macbeth, *India Rubber J.*, May 7, 1938, pp. 5-6, 10-11. (To be continued.)

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Charles Goodyear. P. W. Barker, *Rubber Age (N. Y.)*, May, 1938, pp. 101-104. (To be continued.)

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Patents and Trade Marks

MACHINERY

United States

20,711. (Reissue). **Tread Splitter.** G. F. Connelly, San Francisco, assignor to Capital National Bank, Sacramento, both in Calif.
2,114,708. **Footwear Mold.** D. G. Gash, Victoria, Australia.
2,114,758. **Shrinkage Conveyer for Rubber Strips.** H. L. Young, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,115,477. **Hand Shield.** A. J. Bartholme, Jr., Hondo, Tex.
2,115,752. **Rubber Spreader.** A. S. Stumpp, Fairfield, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
2,116,222. **Rubber Thread Making Machine.** W. M. Spencer, Trenton, N. J., assignor, by mesne assignments, to Filatex Corp., New York, N. Y.
2,116,512. **Retreader.** G. R. Ericson, Kirkwood, and J. H. Klasey, St. Louis, both in Mo., assignors, by mesne assignments to Bendix Products Corp., South Bend, Ind.
2,116,916. **Device to Remove Articles from Forms.** R. Van Hyning, assignor to R. Gammeter, Akron, O.
2,117,208. **Knitting Machine.** A. E. and F. R. Page, both of Brooklyn, assignors to Scott & Williams, Inc., New York, all in N. Y.
2,117,238. **Tire Rim.** W. S. Brink, assignor to Firestone Steel Products Co., both of Akron, O.

Dominion of Canada

373,219. **Tread Slitter.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. Eger, Grosse Pointe Park, Mich., U. S. A.
373,220. **Molder and Vulcanizer.** Dunlop Rubber Co., Ltd., London, assignee of H. Willshaw, Birmingham, both in England.
373,337. **Mat Blank Former.** Baldwin Rubber Co., assignee of B. S. Glougie, both of Pontiac, Mich., U. S. A.
373,639. **Endless Belt Vulcanizer.** Boston Woven Hose & Rubber Co., Cambridge, assignee of J. M. Bierer, Waban, both in Mass., U. S. A.

United Kingdom

478,435. **Tire Pressure Gages.** W. Koehne.
478,529. **Looms for Weaving Elastic Webs.** C. Clutsom.
478,674. **Mold.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and E. A. Phillips.
478,908. **Heel Mold.** United States Rubber Products, Inc.
479,015. **Tube Perforating Device.** Consolidated Rubber Manufacturers, Ltd.
479,092. **Tire Builders.** Wingfoot Corp.

Germany

658,725. **Mill.** Allgemeine Elektricitats-Gesellschaft, Berlin.
659,214. **Shaft Bearing.** Continental Gummi-Werke A.G., Hannover.
659,900. **Mold.** Continental Gummi-Werke A.G., Hannover.
659,985. **Device and Method for Making Hollow Rubber Goods.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by C. and E. Wiegand, both of Berlin.
659,986. **Retreader.** Henry Simon, Ltd., Cheadle Heath, England. Represented by H. Kleinschmidt, Berlin.
660,061. **Calender.** Joseph Eck & Sohne G.m.b.H., Dusseldorf-Heerdt.

PROCESS

United States

2,114,308. **Container Closure.** W. I. McGowan and A. J. Puschin, both of Cambridge, assignors to Dewey & Almy Chemical Co., N. Cambridge, all in Mass.
2,114,413. **Tire Chain Cross Links.** M. D. Albrecht, Omaha, Neb.
2,114,636. **Composition.** C. S. Nelson, assignor, by mesne assignments, to Carborundum Co., both of Niagara Falls, N. Y.
2,115,154. **Treating Fabrics.** W. H. Alton, New York, N. Y., and H. I. Jones, Wilmette, Ill., assignors to R. T. Vanderbilt Co., Inc., New York, N. Y.
2,115,254. **Sheet Rubber Article.** P. Van Cleef, assignor, by mesne assignments, to Van Cleef Bros., both of Chicago, Ill., a partnership consisting of N., F., and P. Van Cleef.
2,115,366. **Shoe.** C. J. Jannings, Union, assignor to Hamilton, Brown Shoe Co., St. Louis, both in Mo.
2,115,543. **Covering Perforated Rolls.** C. C. Thackray, Westmount, P. Q., Canada, assignor to United States Rubber Products, Inc., New York, N. Y.
2,115,560 and 2,115,561. **Forming Rubber Articles.** S. R. Ogilby, W. New Brighton, assignor to United States Rubber Co., New York, both in N. Y.
2,115,705. **Plasticizing Rubber.** W. F. Busse, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,116,083. **Medical Tube.** W. Rüsch, Rommelshausen, Germany.
2,116,089. **Deproteinization of Rubber Latex.** L. Wallerstein, New York, N. Y.
2,116,848. **Carbon Black.** F. C. Reed, assignor to L. R. J. Snyder, both of Kansas City, Mo.
2,117,258. **Rubber.** P. Schidrowitz and J. W. Malden, both of London, England, assignors to Vultex Corp. of America, Cambridge, Mass.

Dominion of Canada

373,515. **Garter Tab.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of L. H. Bardach, Hartford, Conn., and N. H. Curtiss, Clifton, N. J., co-inventors, both in the U. S. A.
373,519. **Elastic Thread.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of B. H. Foster, Maplewood, N. J., U. S. A.
373,545. **Storage Battery.** N. V. Philips' Gloeilampenfabrieken, assignee of J. Zernike, both of Eindhoven, Holland.
373,681. **Graphite Oil.** R. M. Hollingshead Corp., Camden, assignee of T. J. Bagley, Haddonfield, both in N. J., and V. M. Mantz, Philadelphia, Pa., co-inventors, all in the U. S. A.
373,747. **Fabric Processing.** T. L. Shepherd, Portslade, England.
373,748. **Thread, Band, Strip, and Tape.** T. L. Shepherd, Portslade, England.
373,749. **Rubber Process.** T. L. Shepherd, Portsdale, England.

United Kingdom

477,911. **Rubber.** International Latex Processes, Ltd., E. A. Murphy, and G. W. Trobridge.
477,940. **Rubber.** R. M. Cole.
478,103. **Molding Tires.** Soc. Italiana Pirelli.
478,167. **Coating Webs.** R. H. Wilbur.
478,406. **Concentrating Rubber Dispersions.** Metallges. A.G.
478,903. **Thread.** International Latex Processes, Ltd., and R. G. James.
479,026. **Vulcanizing.** T. L. Shepherd.
479,194. **Elastic Fabric.** I. and S. A. Hartman.
479,265. **Sponge Rubber.** International Latex Processes, Ltd.

Germany

658,459. **Cellular Rubber Layers.** J. Pennel & Jh. Flipo, Roubaix, France. Represented by A. Schulze, Berlin.
659,411. **Combining Rubber and Fabric.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by C. and E. Wiegand, both of Berlin.
659,987. **Fabrics from Rubber Thread.** T. L. Shepherd, London, England. Represented by H. Caminer, Berlin.

CHEMICAL

United States

2,115,053. **Rubber Hydrohalide - Sulphide Compositions.** H. A. Winkelmann, assignor to Marbon Corp., both of Chicago, Ill.
2,115,054. **Rubber Hydrohalide - Phosphate Compositions.** H. A. Winkelmann, assignor to Marbon Corp., both of Chicago, Ill.
2,115,055. **Rubber Hydrohalide - Lead Compositions.** H. A. Winkelmann, assignor to Marbon Corp., both of Chicago, Ill.
2,115,473. **Antioxidants.** W. L. Semon, Silver Lake Village, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,115,896. **Rubber Substitutes.** P. J. Wiezevich, now by judicial change of name P. J. Gaylor, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,116,065 and 2,116,066. **Coating Composition.** J. L. Elliott, Dallas, Tex., assignor to International Printing Ink Corp., New York, N. Y.

2,116,333. **Antioxidants.** I. Williams, Woodstown, and W. A. Douglass, Penns Grove, both in N. J., and A. M. Neal, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,116,978. **Vulcanizing Composition.** L. Meuser, Naugatuck, Conn., assigner, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,117,120. **Mercaptothiazoles.** C. H. Smith, Tallmadge, and C. W. Gray, assignors to Wingfoot Corp., both of Akron, all in O.

Dominion of Canada

373,204. **Chlorinated Rubber.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of L. McCulloch, Pittsburgh, Pa., **U. S. A.**

373,249. **Rubberlike Polymers.** Shell Development Co., San Francisco, assignee of M. de Simo and F. B. Hilmer, co-inventors, both of Berkeley, all in Calif., **U. S. A.**

373,368. **Antioxidants.** B. F. Goodrich Co., New York, N. Y., assignee of P. C. Jones, Akron, O., both in the U. S. A.

373,369. **Vulcanizable Composition.** B. F. Goodrich Co., New York, N. Y., assignee of B. St. J. Garvey, Akron, O., both in the U. S. A.

373,505. **Plasticizer.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Woodstown, and C. C. Smith, Carneys Point, co-inventors, both in N. J., U. S. A.

373,514. **Reaction Product.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. E. Messer, Cheshire, Conn., U. S. A.

373,516. **Furoyl Chloride.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of L. Meuser, Naugatuck, Conn., U. S. A.

373,520. **Hard Rubber.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of H. H. Harkins, River Edge, N. J., U. S. A.

373,555. **Plasticized Rubber.** Standard Oil Development Co., Linden, assignee of P. J. Wiezevich, whose name has been changed to P. J. Gaylor, Elizabeth, both in N. J., U. S. A.

373,566. **Petroleum Hydrocarbon Stabilizer.** Wingfoot Corp., Wilmington, Del., assignee of A. M. Clifford, Stow, O., both in the U. S. A.

373,568 and 373,569. **Golf Ball Cover.** Wingfoot Corp., Wilmington, Del., assignee of J. A. Merrill, Akron, O., both in the U. S. A.

373,570. **Antioxidant.** Wingfoot Corp., Wilmington, Del., assignee of W. D. Wolfe, Cuyahoga Falls, O., both in the U. S. A.

373,571. **Antioxidant.** Wingfoot Corp., Wilmington, Del., assignee of C. F. Winans, Akron, O., both in the U. S. A.

373,663. **Diluent for Rubber Solutions.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Woodstown, and C. C. Smith, Carneys Point, co-inventors, both in N. J., U. S. A.

United Kingdom

477,826. **Latex Composition.** W. Binns.

477,964. **Plastic Compositions.** A. Rosenthal.

478,100. **Insulating Materials.** Siemens & Halske A.G.

478,102. **Anti-Adhesive for Rubber Surfaces.** Soc. Italiana Pirelli.

478,593. **Synthetic Rubber.** B. J. Habgood, R. Hill, L. B. Morgan, and Imperial Chemical Industries, Ltd.

478,664. **Chlorinated Rubber.** N. Bennett and Imperial Chemical Industries, Ltd.

478,701. **Synthetic Resins.** G. W. Johnson (I. G. Farbenindustrie A.G.).

478,922 **Accelerators.** Belvedere Chemical Co., Ltd.

479,054. **Calcium Carbonate.** A. H. Stevens (Pittsburgh Plate Glass Co.).

479,111. **Laminated Composition.** E. I. du Pont de Nemours & Co., Inc.

479,170. **Insulating Compositions.** Electrical Research Products, Inc.

479,264. **Latex Composition for Sponge Rubber.** International Latex Processes, Ltd.

479,350. **Phenol-Aldehyde Condensation Products.** Beck, Koller & Co. (England), Ltd.

479,478. **Polymerized *iso*-Olefine Compositions.** Standard Oil Development Co.

479,625. **Chloroprene - Alkyd Resin Composition.** British Thomson-Houston Co., Ltd.

479,766. **Softeners.** Deutsche Hydrierwerke, A.G.

Germany

659,368. **Combinations of Mixed Polymerizates of Butadiene and Acryl Acid Nitril.** Metzeler-Gummiwerke, A.G., Munich.

659,627. **Adhesive Mixes from Aqueous Rubber Dispersions and Solvents.** Dunlop Rubber Co., Ltd., London, England, and Anode Rubber Co., Ltd., St. Peter's Port, Channel Islands. Represented by C. Wiegand, Berlin.

660,046. **Separating Chlorinated Rubber from Its Solutions.** Deutsche Gold-und Silber-Scheideanstalt vormals Roessler, Frankfurt a.M.

GENERAL

United States

2,114,317. **Truss.** E. P. Riess, Sheboygan, Wis.

2,114,338. **Glove.** J. T. Dowdall, assignor to S. M. Straus, both of Gloversville, N. Y.

2,114,407. **Myopia Treating Apparatus.** B. Tsumura, Tokyo, Japan.

2,114,474. **Tile Flooring Section.** J. Labra, Long Island City, N. Y.

2,114,517. **Tension Band.** G. E. Apel, Belmont, and J. M. Patterson, Waban, assignors to Boston Woven Hose & Rubber Co., Cambridge, all in Mass.

2,114,532. **Trouser Guard.** B. Hochberg, Brooklyn, N. Y.

2,114,570. **Shaft Coupling.** C. Renaud, Mont-sur-Marchienne, assignor to Ateliers de Constructions Electriques de Charleroi, Brussels, Belgium.

2,114,686. **Container.** D. Roberts, New York, and F. W. Peel, Yonkers, both in N. Y., assignors to Rubatex Products, Inc., Wilmington, Del.

2,114,710. **Mat.** C. D. Holcomb, Akron, O.

2,114,749. **Shoe.** P. Y. Smiley, Kitchener, Ont., Canada, assignor to B. F. Goodrich Co., New York, N. Y.

2,114,753. **Punching Implement.** H. E. Waner, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,114,771. **Pipe Joint and Packing Ring.** L. A. Turner, Widnes, and E. G. Latham, Daveyhulme, Manchester, assignors to Turner & Newall, Ltd., Rochdale, all in England.

2,114,794. **Apparatus for Hollow Bodies from Cellulose Products.** K. Bratring, Berlin, Germany, assignor to International Containers, Ltd., London, England.

2,115,035. **Stopper.** C. V. Morgan, Brooklyn, N. Y.

2,115,075. **Garter.** R. Karger, Highland Park, Ill.

2,115,092. **Wheel.** F. Weinberg, Detroit, Mich.

2,115,119. **Club Grip.** T. S. Park, Houston, Tex.

2,115,146. **Garment.** W. Kops, assignor to Kops Bros., Inc., both of New York, N. Y.

2,115,151. **Ornamental Rubber Material.** J. Stein, New York, N. Y.

2,115,216. **Scraper.** M. E. Samuel, Martins Ferry, O.

2,115,235. **Hose Supporter.** E. H. Reed, assignor of one-half to R. M. Olds, both of Detroit, Mich.

2,115,314. **Ore Mill.** W. F. J. McErlean, Vancouver, B. C., Canada.

2,115,333. **Arm Shield.** M. Isaac, Leipzig, Germany.

2,115,334. **Luggage Curtain.** A. Kaufmann, South Orange, N. J., assignor to K. Kaufmann & Co., Inc., a corporation of N. J.

2,115,388. **Safety Plug.** R. J. Heitzman, assignor of one-fourth to W. E. Ressler, both of Shamokin, Pa.

2,115,424. **Closure.** G. Lesti, Cleveland, O.

2,115,427. **Vibration Damper.** H. E. Olson, St. Joseph, Mich., assignor to Reo Motor Car Co., a corporation of Mich.

2,115,437. **Bushing.** O. B. Welker, Middletown, Conn., assignor to A. R. Teare, Cleveland, O.

2,115,443. **Bathing Suit.** A. L. Flesh, assignor to Piqua Hosiery Co., Inc., both of Piqua, O.

2,115,458. **Engine Mount.** H. D. Geyer, Dayton, O., assignor, by mesne assignments to General Motors Corp. Detroit, Mich.

2,115,495. **Bushing.** H. H. Mapelsden, Bridgeport, Conn., assignor to General Electric Co., a corporation of N. Y.

2,115,627. **Elastic Fabric.** R. M. Foster, Camden, N. J., assignor to Hastings & McIntosh Truss Co., Philadelphia, Pa.

2,115,651. **Rubber Horseshoe Lift Plate.** T. F. and J. J. Sexton, both of Baltimore, Md.

2,115,672. **Resilient Support.** E. F Riesing, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,115,682. **Expansion Joint.** E. Hutzenlaub, assignor to P. Lechler, both of Stuttgart, Germany.

2,115,926. **Ball Handle.** M. C. Hatton, Laguna Beach, Calif.

2,115,997. **Impeller and Lining Construction.** G. G. Morse, assignor to Morse Bros. Machinery Co., both of Denver, Colo.

2,116,009. **Water Bag.** M. H. Brown, Polk, Mo.

2,116,087. **Valve Core.** J. Wahl, Rosedale, N. J., assignor, by mesne assignments, to Scovill Mfg. Co., Brooklyn, N. Y.

2,116,090. **Tire Valve.** S. T. Williams, Bellerose, N. Y., assignor to Scovill Mfg. Co., Waterbury, Conn.
2,116,091. **Potential Producing Cell.** J. S. Williams, assignor to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.
2,116,272. **Abrasive Wheel.** A. W. Mall, Chicago, Ill.
2,116,304. **Shuttlecock.** G. Crespin, assignor to A. Goldstein, both of New York, N. Y.
2,116,342. **Twister Cap.** W. B. Cooper, Rome, Ga., assignor to Tubize Chatillon Corp., New York, N. Y.
2,116,360. **Undergarment.** J. M. Lindh, assignor, by mesne assignments, to Munsingwear, Inc., both of Minneapolis, Minn.
2,116,367. **Metal Treating Apparatus.** E. W. Smith, Melrose, assignor to Submarine Signal Co., Boston, both in Mass.
2,116,426. **Athletic Field Guardrail.** L. F. Cecil, Shanghai, China.
2,116,479. **Ball.** M. B. Reach, Springfield, Mass.
2,116,481. **Display Folder.** J. W Sweeney, assignor to Narrow Fabric Co., both of W. Reading, Pa.
2,116,560. **Bedpan Cover and Cushion.** L. A. Chambers, St. Louis, Mo.
2,116,646. **Textile Cleaner.** M. M. Silverman, Hartford, Conn., assignor to Better Brushes, Inc., Palmer, Mass.
2,116,675. **Switch.** W. H. Frank and J. A. Messing, both of Detroit, Mich.
2,116,701. **Elastic Fabric.** A. A. Hodgkins, Marblehead, assignor to Everlastik, Inc., Chelsea, both in Mass.
2,116,822. **Undergarment.** S. L. Berger, Newton Center, assignor to Boston Knitting Mills, Inc., Newton, both in Mass.
2,116,833. **Spray.** H. P. Jenks, Newton, Mass.
2,116,856. **Casing and Tubing Head.** S. P. Tschappat, Tulsa, Okla.
2,116,864. **Massage and Shampoo Device.** A. Fehrenbach, New York, N. Y.
2,116,937. **Tire Cord.** W. E. Vecsey, assignor to General Tire & Rubber Co., both of Akron, O.
2,116,938. **Closure Cap and Package.** W. P. White, Glencoe, assignor to White Cap Co., Chicago, both in Ill.
2,116,956. **Antislip Device for Footwear.** W. Vorwerk, Wuppertal-Barmen, Germany.
2,116,984. **Laminated Fabric.** G. Seddon, Brooklyn, N. Y.
2,117,046. **Apparatus to Make Resilient Bushings.** O. B. Welker, Middletown, Conn.
2,117,121. **Ship Fender.** W. R. Urquhart, Akron, and E. F. Maas, Cuyahoga Falls, assignors to Wingfoot Corp., Akron, all in O.
2,117,174. **Tooth Brush.** J. M. Jones. Great Neck, N. Y.
2,117,183. **Shoe.** H. G. Lumbard, Auburn, Me.
2,117,264. **Resilient Support.** C. E. Workman, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

373,221. **Garment.** Earnshaw Knitting Co., Newton, assignee of J. H. Le-Coney, Bedford, both in Mass., U. S. A.
373,226. **Inking Roll Sectioning Apparatus.** Ideal Roller & Mfg. Co., Chicago, assignee of H. E. Lambert, Berwyn, both in Ill.
373,275 **Combination Overalls.** R. Cherner, Hamilton, Ont.
373,301 and 373,302. **Surgical Pump or Syringe.** H. H. Schulz, London, England.
373,370. **Cot Fastener.** Henney Motor Co., assignee of G. L. Runkle, both of Freeport, Ill., U. S. A.
373,381. **Continuous Track Tractor.** Marmon-Herrington Co., Inc., assignee of A. W. Herrington, both of Indianapolis, Ind., U. S. A.
373,422. **Slip Cover.** W. L. Fry, Bloomfield Hills, Mich., U. S. A.
373,431 and 373,432. **Infant's Bathing Device.** B. H. Kennedy, Pittsford, N. Y., U. S. A.
373,433 and 373,436. **Vehicle Suspension.** J. Kolbe, Hannover, Germany.
373,450. **Torsional Shock Absorber.** G. E. Stanley, Coventry, England.
373,459. **Cap and Package.** Anchor Cap & Closure Corp., Long Island City, N. Y., assignee of H. H. Jones, Cleveland, O., both in the U. S. A.
373,517. **Shoe Elastic Material.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. F. Roberts, Rye, N. Y., U. S. A.
373,518. **Footwear.** Dominion Rubber Co., Ltd., assignee of A. G. McKinnon, both of Montreal, P. Q.
373,521. **Boot.** Dominion Rubber Co., Ltd., Montreal. P. Q., assignee of W. J. Gruner, Naugatuck, Conn., U. S. A.
373,540. **Laminated Fiber - Rubber Sheet Material.** Latex Fiber Industries, Inc., assignee of A. F. Owen, both of Beaver Falls, N. Y., U. S. A.
373,567. **Wheel or Rim.** Wingfoot Corp., Wilmington, Del., assignee of A. W. Woodward, Kent, O., both in the U. S. A.
373,614. **Girdle.** M. G. Moore, St. Paul, Minn., U. S. A.
373,675. **Railway Device.** Fabreeka Products Co., Inc., Boston, assignee of W. P. Brennan, Newton, and T. F. Dwyer, Jr., Cambridge, all in Mass., U. S. A.
373,689. **Adhesive Material.** Kendall Co., Boston, Mass., assignee of M. H. Kemp, Oak Park, Ill., both in the U. S. A.
373,704. **Mortician's Table.** Undertakers Supply Co., assignee of E. Ocasek, both of Chicago, Ill., U. S. A.
373,714. **Surface Cleaning Device.** W. J. Wesseler, E. Cleveland, O., assignee of L. O. Balinger, Bloomfield Hills, Mich., both in the U. S. A.
373,751. **Garment.** H. A. Smith, Fairfield, Conn., U. S. A.
373,756. **Wringer.** R. Thomas, Neunkirchen, Siegen, Germany.

United Kingdom

476,459. **Portable-Track Wheels.** C. A. Henneuse.
476,693. **Jacking Apparatus.** G. Bowman, G. C. Burgess, and S. Smith & Sons, Ltd. (Motor Accessories).
476,859. **Vacuum Cleaners.** P. Pfeiffer, L. Hahn, and E. Faber (trading as Mauz & Pfeiffer).
476,963. **Table Game Apparatus.** O. Kind.
477,070. **Lubricating Pumps.** A. H. Stevens (Cities Service Oil Co.).
477,135. **Fastenings.** Auster, Ltd., S. A. Carty, and W. W. Small.
477,190. **Concrete Piles.** Handelmaatschappij J. De Wit & N. V. Zonen, and J. De Wit.
477,243. **Wheels.** H. Hurlimann.
477,452. **Vacuum Cleaner Nozzles.** Electrolux, Ltd.
477,469. **Balls.** A. J. Ransford (H. Goldsmith).
477,492. **Spring Surfaces.** J. C. Macneill.
477,510. **Fluid Pressure Brakes.** Electronmetal Ges.
477,523. **Elastic Fabrics.** T. L. Shepherd.
477,550. **Fluid Pressure Brakes.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and F. J. Tarris.
477,645. **Hinges.** Monroe Auto Equipment Co.
477,674. **Shock Absorbers.** Etablissements C. Faure-Roux.
477,736. **Sound Reproducing Devices.** A. W. Coker and King & Jarrett, Ltd.
477,737. **Bath Mats.** A. L. Trigg.
477,769. **Toy Boats.** J. F. Lobb.
477,784. **Yarn Winder.** R. Holt.
477,785. **Golf Clubs.** J. H. Turner.
477,821. **Darts.** O. Underhill.
477,825. **Projection Screens.** M. Lennard.
477,865. **Tires.** C. M. Collins and W. M. Henderson.
477,879. **Coupling for Cable Sheathing.** Siemens-Schuckertwerke A.G.
477,941. **Windscreens.** Bornemann-Verwaltung Ges.
477,951. **Resilient Supports.** M. Houdaille and C. Lecler.
477,966. **Coated Fabrics.** Naamlooze Vennootschap Hollandiafabrieken Kattenburg & Co.
477,968. **Netted Fabrics.** J. I. De. Gennes, (née Leduc).
477,985. **Printing Machines.** J. Wolf.
478,008. **Cricket Bat Handles.** E. J. H. Brooks.
478,009. **Windscreens.** G. Beaton & Son, Ltd., and F. C. Young.
478,029. **Duplicating Machines.** A. F. Burgess (Ditto, Inc.).
478,030. **Cartridge Wads.** H. Foch.
478,064. **Bottle Closures.** E. Moster.
478,101. **Hinges.** Getefo Ges. Fur Technischen Fortschritt.
478,117. **Stays.** Auster, Ltd., S. A. Carty, and W. W. Small.
478,135. **Roofs.** T. Greis.
478,136. **Stuffing Box Substitutes.** C. Freudenberg Ges.
478,144. **Valves.** Scovill Mfg. Co. and W. J. Winter.
478,154. **Ship Fenders.** E. H. Stephens.
478,158. **Self - Leveling Arrangements.** Nederlandsche Maatschappij Sogelis N. V.
478,177. **Electrolytic Condensers.** British Electrolytic Condenser Co., Ltd., D. J. P. Phillips, and G. C. Gaut.
478,180. **Grinding Rings.** H. Randall.
478,201. **Rollers.** L. Thiry.
478,274. **Batteries.** S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).
478,294. **Reservoir Pads.** A. A. Johnson.
478,312. **Gramophone Turntables.** A. Schumann.
478,321. **Pistons.** G. Carpenter and Electric Hose & Rubber Co., Ltd.
478,334. **Glass Threads.** Comtoir Des Textiles Artificiels, R. Salomon, and A. L. M. Rouy.
478,347. **Valves.** Cherry-Burrell, Ltd., and F Rodgers.
478,374. **Undergarments.** R. L. Klin.
478,385. **Conveyers.** Barnett & Foster, Ltd., and C. W. Raymond.
478,404. **Knitted Fabrics.** Everlastic Ltd.

478,459. **Trusses.** A. C. Herzberg.
478,461. **Hair Curler.** E. Volkel.
478,466. **Billiard Tables.** J. R. Tucker.
478,479. **Tennis Racket Balancer.** L. R. Gleadall.
478,497. **Trousers.** A. Polikoff and Polikoff, Ltd.
478,503. **Guns.** Dunlop Rubber Co., Ltd., J. Wright, and H. Trevaskis.
478,528. **Bottle Closure Caps.** R. W. Webster.
478,564. **Cans.** Crown Cork & Seal Co., Inc.
478,631. **Hose Pipes.** British Thomson-Houston Co., Ltd.
478,671. **Air-Raid Shelters.** J. T. Muirhead.
478,676. **Universal Joints.** Silentbloc, Ltd. (L. Thiry).
478,677. **Device for Delustering Textiles.** British Schuster Bates Machine Co., Ltd. (F. Schuster).
478,686. **Apparatus for Treating Textiles.** British Schuster Bates Machine Co., Ltd. (F. Schuster).
478,689. **Sand Blast.** Sachsische Glasfabrik A. Walther & Sohne A.G.
478,690. **Shoe Cover.** Albeko Schuhmaschinen-Ges.
478,710. **Photographic Shutters.** O. J. R. Brookman.
478,718. **Bottle Closures.** C. J. Parker.
478,721. **Agitating Machines.** A. Schrey.
478,723. **Wheel Chain Gearing.** R. Janesch.
478,736. **Spring Surfaces.** N. Sluyter.
478,751. **Bottle Closure Caps.** R. W. Webster.
478,752. **Resilient Mountings.** Getefo Ges. Fur Technischen Fortschritt.
478,763. **Anti-Skid Devices.** J. Lewis.
478,781. **Hair Combs.** G. Ellis.
478,788. **Fountain Pens.** W. K. A. Frey.
478,790. **Overalls.** J. W. Robinson and F. H. Dollin.
478,823. **Elastic Pile Fabrics.** L. Rigg.
478,866. **Endless Vehicle Tracks.** Zavody Tatra Akciova Spolecnost Pro Stavbu Automobilu A Zeleznicnich Vozu.
478,868. **Motor Vehicles.** P. C. A. M. D'Aubarede.
478,909. **Aero Engine Mountings.** Getefo Ges. Fur Technischen Fortschritt.
478,923. **Surgical Syringes.** G. Moos.
478,946. **Conveyers.** G. H. Schieferstein.
478,958. **Throat Guards.** E. Baron, and B. Lubner.
478,982. **Pumps.** Graham-Paige Motors Corp.
479,059. **Container Lids.** H. L. Carpenter.
479,065. **Plywood Casks.** I. G. Farbenindustrie A.G.
479,078. **Buoys.** H. Scott-Paine and S. N. Barker.
479,090. **Apparatus to Dry Grain.** G. W. Riley, and G. Scott & Son (London).
479,102. **Shoe Uppers.** Bata Akciova Spolecnost.
479,119. **Undergarments.** Cooper's, Inc.
479,129. **Hot Water Bottles.** D. Sarason.
479,132. **Artificial Feet and Ankle Joints.** H. Yearsley and G. S. Kloet.
479,144. **Wheel Arrangement.** O. D. North, P. G. Hugh, and Scammell Lorries, Ltd.
479,205. **Venting Barrels.** A. J. Wakelin.
479,244. **Respiratory Masks.** A. J. J. Poelman, M. A. Germain, and Etablissements R. Schneider.
479,331 and 479,332. **Latex Coated Seeds, Bulbs, Etc.** G. E. Heyl.
479,367. **Fragile Article Holders.** W. Fitzhugh, and H. Baker.
479,377. **Universal Joints.** M. F. A. Julien.
479,418. **Cow Milkers.** L. H. P. Bland.
479,442. **Golf Bags.** J. McGinn.
479,463. **Buoyant Wearing Apparel.** W. Milne.
479,480. **Sole Laying Machines.** British United Shoe Machinery Co., Ltd. (United Shoe Machinery Corp.).
479,497. **Torpedo Discharging Gear.** Vickers-Armstrongs, Ltd., E. C. Pearson, and J. W. Swindale.
479,525. **Darts.** O. Underhill.
479,872. **Centrifugal Separators.** M. Vogel-Jorgensen.

Germany

659,163. **Belt.** E. Stegling, Hannover.
660,151. **Bandage.** Lohmann Komm. Ges., Fahr a. Rhein.

TRADE MARKS

United States

355,698. **Dual Grip.** Tires. General Tire & Rubber Co., Akron, O.
355,720. **Plylock.** Belts and joints. B. F. Goodrich Co., New York, N. Y.
355,755. **Macy's.** Golf balls. R. H. Macy & Co., Inc., New York, N. Y.
355,770. **Densheath.** Wire and cable. Anaconda Wire & Cable Co., New York, N. Y.
355,771. **Vitrotex.** Wire and cable. Anaconda Wire & Cable Co., New York, N. Y.
355,772. **Vitronamel.** Wire and cable. Anaconda Wire & Cable Co., New York, N. Y.
355,798. **Launderite.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.
355,942. **Lasticflor.** Corsets, brassieres, stockings, etc., for surgical and orthopedic purposes. J. Roempler A.G., Zeulenroda, Germany.
355,945. Representation of a label containing the letters: **"E C."** Belts and belting. Goodyear Tire & Rubber Co., Akron, O.
355,973. Representation of a diamond containing the word: **"Pac-Oil."** Packing. United States Rubber Products, Inc., New York, N. Y.
356,084. Representation of a man holding one foot up showing the sole and the words: **"Ends of the Cord Thread Produces the Wear and Non-Skid. Gro Cord. Gro Cord."** Soles and heels. Lima Cord Soles & Heel Co., Lima, O.
356,086. Representation of a circle containing vertical lines. Heels and soles. Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.
356,111. **Macy's.** Narrow elastic tape, dress shields, etc. R. H. Macy & Co., Inc., New York, N. Y.
356,128. **Cem Beads.** Carbon black. Binney & Smith Co., New York, N. Y.
356,135. **Obligaine.** Corsets, brassieres, etc. Etablissements Boudios, Romilly-sur-Seine, France.
356,140. **Aristocrat.** Heels and soles. O'Sullivan Rubber Co., Inc., New York, N. Y.
356,165. Representation of a double circle containing the letters: **"A-S."** Tires and inner tubes. Fisk Rubber Corp., Chicopee Falls, Mass.
356,195. **Rain'parel.** Raincoats. Mansbrooke Rainwear Corp., New York, N. Y.
356,219. **Darex.** Balloons. Dewey & Almy Chemical Co., Cambridge, Mass.
356,224. Label containing representation of an automobile and the words: **"At the Sign of the Red Automobile."** Automobile seat covers. B. F. Goodrich Co., New York, N. Y.
356,225. **"Flexicon."** Bands and ropes. Perfect Tape Coupler Co., Ltd., Bradford, England.
356,241. **Seal Master.** Valve balls. Keystone Brass & Rubber Co., Philadelphia, Pa.
356,245. Representation of a label containing a coat of arms and the words: **"Tellshire P B."** Rainwear and sportswear. Plottel Bros., New York.
356,271. **Colonial.** Combs. Glemby Co., Inc., New York, N. Y.
356,275. Representation of Pan and the word: **"Pan."** Prophylactic goods. W. H. Reed & Co., Atlanta, Ga.
356,339. Representation of two diamonds and a wreath with the letter: **"G"** between them. Polishing gauze and cloths, spot remover, automobile top dressing, etc. B. F. Goodrich Co., New York, N. Y.
356,341. Representation of two diamonds and a wreath with the letter: **"G"** between them. Rubber cement, auto top seal, and tire dough. B. F. Goodrich Co., New York, N. Y.
356,341. Representation of two diamonds and a wreath with the letter: **"G"** between them. Acid seal paint, touch-up enamel, automobile and furniture polish, etc. B. F. Goodrich Co., New York, N. Y.
356,342. Representation of two diamonds and a wreath with the letter: **"G"** between them. Rubber bands and erasers. B. F. Goodrich Co., New York, N. Y.
356,343. Representation of two diamonds and a wreath with the letter: **"G"** between them. Rubber lined tanks, containers, etc. B. F. Goodrich Co., New York, N. Y.
356,344. Representation of two diamonds and a wreath with the letter: **"G"** between them. Paper machine rolls, wringer rolls, and other rubber surfaced rolls, etc. B. F. Goodrich Co., New York, N. Y.
356,345. Representation of two diamonds and a wreath with the letter: **"G"** between them. Druggists' sundries. B. F. Goodrich Co., New York, N. Y.
356,438. **Cell-tite.** Structural material for vibration absorption and heat and sound insulation, etc. Sponge Rubber Products Co., Derby, Conn.
356,440. **Hi-Way Patrol.** Bicycles. Goodyear Tire & Rubber Co., Inc., Wilmington, Del.
356,517. **It's the Tops by Bonzette, Inc.** Corsets, girdles, etc. Bonzette Foundations, Inc., New York, N. Y.
356,531. Representation of two diamonds and a wreath with the letter: **"G"** between them. Fan belts, hose, cord air pressure bags for repairing pneumatic casings, etc. B. F. Goodrich Co., New York, N. Y.
356,532. **Truflex.** Tire repair patches. Tru-Flex Rubber Products Co., Los Angeles, Calif.
356,535. Representation of a ball containing the words: **"Official Softball Joint Rules Committee."** Softballs. Joint Rules Committee on Softball, Elizabeth, N. J.

Market Reviews

CRUDE RUBBER

Commodity Exchange

THE Commodity Exchange table published here shows prices of representative future contracts on the New York market during the past two months.

After closing at 11.34¢ per pound on April 30, July futures advanced during the first half of May to close at 11.87¢ per pound on May 14. This rise was influenced chiefly by firmer cables from London and strength of the local securities exchange. Upon the release of lower consumption figures for April and with strike news from Akron, July futures receded to close at 11.18¢ per pound on May 21. The closing price on May 31, the day the International Rubber Regulation Committee met to decide on third-quarter export quotas, was 11.48¢ per pound. During the past four weeks the maximum variation in prices for delivery during the next year was 0.61¢ per pound, which compares with 0.78¢ per pound, the maximum spread for April. Trading during the month was generally light.

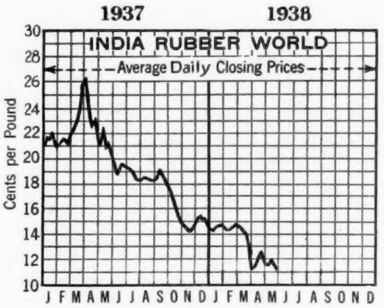
Crude rubber consumption in the United States during April was 8.2% below the March figure and 46% below consumption for April, 1937. Imports of crude rubber during April continued above consumption, with the result that stocks on hand in this country increased for the ninth consecutive month. On the following page are reported United States statistics on imports, consumption, stocks, and crude rubber afloat.

For the first quarter of 1938 all countries participating in the Restriction Scheme have undershipped their quotas by a total of 17,114 tons, 16,349 tons of which are accounted for by a deficiency in actual exports under permissibles from Netherland India.

In view of increasing world stocks and with no indications for a marked increase in consumption in the near future, the I. R. R. C., meeting in London on May 31, reduced the export quota from 60 to 45% of basic production for the third quarter of 1938. This action is hoped to bring exports in balance with consumption, thus curtailing the increase in world stocks.

TABULATED WEEK-END CLOSING PRICES

Futures	Mar. 26	Apr. 30	May 7	May 14	May 21	May 28
Apr.	12.88	.....	.....	.....	.....	.....
May	.....	11.25	11.80	11.83	11.15	.....
June	.....	11.29	11.82	11.87	11.18	11.29
July	13.10	11.34	11.85	11.91	11.21	11.31
Sept.	13.25	11.48	12.04	12.04	11.38	11.45
Dec.	13.45	11.67	12.20	12.23	11.52	11.63
Mar.	.....	11.83	12.35	12.39	11.66	11.78
Apr.	.....	.....	12.40	12.44	11.72	11.83
Volume per week (tons)...	16,850	24,300	12,460	11,470	9,100	9,780



New York Outside Market—Spot Ribbed Smoked Sheets

New York Outside Market

The outside market ruled quiet during the past month with little factory interest and shipment offerings from the Far East generally too high in price for consideration. Census figures from Singapore, according to a Reuter's dispatch, show a decrease in stocks in the hands of Eastern dealers during April and a decline in production. After closing at 11 5/16¢ per pound on April 30, the price of No. 1 ribbed smoked sheets moved upward to close at 12 1/16¢ on May 12. Following this the trend was downward, the spot price reaching 11⅛¢ per pound on May 23. On May 31 the closing price was 11½¢ per pound.

The week-end closing prices on No. 1 ribbed smoked sheets follows: May 7, 11 13/16¢; May 14, 11 13/16¢; May 21, 11⅛¢; May 28, 11 5/16¢.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	April, 1938						May, 1938			
	25	26	27	28	29	30	2	3	4	5
No. 1 Ribbed Smoked Sheet	12¼	11¾	11 13/16	11 11/16	11⅜	11 5/16	11¼	11½	11½	11⅜
No. 2 Ribbed Smoked Sheet	11⅞	11⅜	11 7/16	11 5/16	11	10 13/16	10⅞	11⅛	11⅛	11
No. 3 Ribbed Smoked Sheet	11⅜	10⅞	10 15/16	10 13/16	10½	10 5/16	10⅜	10⅝	10⅝	10½
No. 4 Ribbed Smoked Sheet	11 3/16	10¾	10 13/16	10⅝	10⅜	10 3/16	10¼	10½	10½	10⅜
No. 1 Thin Latex Crepe...	13¼	12¾	12¾	12½	12¼	12 1/16	12¼	12½	12½	12⅜
No. 1 Thick Latex Crepe..	14	13½	13½	13¼	12⅝	12 7/16	12⅜	12⅝	12⅝	12½
No. 1 Brown Crepe.......	11½	11	11 1/16	10 15/16	10⅝	10 7/16	10½	10¾	10¾	10⅝
No. 2 Brown Crepe.......	11⅜	10⅞	10 15/16	10 13/16	10½	10 5/16	10⅜	10⅝	10⅝	10½
No. 2 Amber............	11½	11	11 1/16	10 15/16	10⅝	10 7/16	10½	10¾	10¾	10⅝
No. 3 Amber............	11⅜	10⅞	10 15/16	10 13/16	10½	10 5/16	10⅜	10⅝	10⅝	10½
No. 4 Amber............	11	10½	10½	10⅜	10⅛	9 15/16	9 15/16	10 3/16	10 3/16	10 3/16
Rolled Brown...........	9½	9¼	9 5/16	9 3/16	8⅞	8 11/16	8¾	9	9	9

	May, 1938													
	6	7	9	10	11	12	13	14	16	17	18	19	20	21
No. 1 Ribbed Smoked Sheet	11 13/16	11 13/16	11¾	12	12	12 1/16	12	11 13/16	11 11/16	11 13/16	11⅞	11½	11 5/16	11⅛
No. 2 Ribbed Smoked Sheet	11 9/16	11 9/16	11 7/16	11 11/16	11⅝	11 11/16	11⅝	11 7/16	11 5/16	11 7/16	11½	11⅛	11	10¾
No. 3 Ribbed Smoked Sheet	11 1/16	11 1/16	10 15/16	11 3/16	11⅛	11 3/16	11⅛	10 15/16	10 13/16	10 15/16	11	10⅝	10 7/16	10¼
No. 4 Ribbed Smoked Sheet	10 13/16	10 13/16	10¾	11	11	11 1/16	11	10¾	10⅝	10¾	10 13/16	10½	10 5/16	10⅛
No. 1 Thin Latex Crepe...	12⅞	12⅞	12 13/16	13 1/16	13 1/16	13⅛	13 1/16	12 15/16	12 13/16	12 15/16	13	12⅝	12½	12⅜
No. 1 Thick Latex Crepe..	12⅞	12⅞	12 13/16	13 1/16	13⅛	13 3/16	13⅛	13 3/16	13 1/16	13¼	13 5/16	13	12⅞	12¾
No. 1 Brown Crepe.......	11 3/16	11 3/16	11	11¼	11¼	11 5/16	11¼	11	10⅞	11	11 1/16	10⅝	10 7/16	10¼
No. 2 Brown Crepe.......	11 1/16	11 1/16	10⅞	11⅛	11 1/16	11⅛	11 1/16	10⅞	10¾	10⅞	10 15/16	10½	10 5/16	10⅛
No. 2 Amber............	11 3/16	11 3/16	11	11¼	11¼	11 5/16	11¼	11	10⅞	11	11 1/16	10⅝	10 7/16	10¼
No. 3 Amber............	11 1/16	11 1/16	10⅞	11⅛	11 1/16	11⅛	11 1/16	10⅞	10¾	10⅞	10 15/16	10½	10 5/16	10⅛
No. 4 Amber............	10 9/16	10 9/16	10 7/16	10 11/16	10⅝	10 11/16	10⅝	10 7/16	10 5/16	10 7/16	10½	10⅛	9 15/16	9¾
Rolled Brown...........	9 9/16	9 9/16	9⅜	9⅝	9⅝	9 11/16	9⅝	9 7/16	9 5/16	9 9/16	9 9/16	9 5/16	8⅞	8 11/16

New York Outside Market (Continued)

	May, 1938					
	23	24	25	26	27	28*
No. 1 Ribbed Smoked Sheet...............	11⅛	11 3/16	11¼	11⅛	11 5/16	....
No. 2 Ribbed Smoked Sheet...............	10¾	10 13/16	10⅞	10¾	10 15/16	....
No. 3 Ribbed Smoked Sheet...............	10¼	10 5/16	10⅜	10¼	10 7/16	....
No. 4 Ribbed Smoked Sheet...............	10⅛	10 3/16	10 3/16	10 1/16	10¼	....
No. 1 Thin Latex Crepe..................	12¼	12¼	12⅜	12 3/16	12 7/16	....
No. 1 Thick Latex Crepe.................	12⅝	12⅝	12 11/16	12⅝	12⅞	....
No. 1 Brown Crepe.......................	10¼	10 5/16	10⅜	10¼	10 7/16	....
No. 2 Brown Crepe.......................	10⅛	10 3/16	10¼	10⅛	10 5/16	....
No. 2 Amber.............................	10¼	10 5/16	10⅜	10¼	10 7/16	....
No. 3 Amber.............................	10⅛	10 3/16	10¼	10⅛	10 5/16	....
No. 4 Amber.............................	9¾	9 13/16	9 13/16	9 11/16	9⅞	....
Rolled Brown	8 11/16	8¾	8 13/16	8 11/16	8⅞	....

*Holiday.

U. S. Footwear Imports for Consumption

For March, 1938, by Countries[1]

	Rubber Boots		Rubber Shoes and Overshoes		Rubber-soled Footwear		Rubber Heels and Soles	
Countries	Prs.	$	Prs.	$	Prs.	$	Prs.	$
Czechoslovakia.	...	...	285	146	3,026	616	18	4
Hungary	...	...	150	52	...	...	...	...
United Kingdom	...	...	290	204	50	149	6	5
Canada	2	8	...	...	...	...	...	...
Neth. W. Indies	...	...	...	...	480	160	...	...
Hong Kong...	...	...	...	...	500	29	...	...
Japan	120	244	3,462	291	40,139	11,802	...	...
Total	122	252	4,187	693	44,195	12,756	24	9

[1] Monthly statement No. 3,703, U. S. Dept. of Commerce, Bureau of Domestic & Foreign Commerce.

New York Quotations

New York outside market rubber quotations in cents per pound

	May 27, 1937	Apr. 27, 1938	May 26, 1938
Plantations			
Rubber latex...*gal.*	75/76	46/47	44/45
Paras			
Upriver fine.......	20¾	11¼	11½
Upriver fine......	*26¾	15¼	*15⅜
Upriver coarse ..	14½	8	8
Upriver coarse ...	*21	*13	*12
Islands fine	20½	10½	11
Islands fine	*26	*14½	*14¾
Acre, Bolivian fine	21¼	11½	11¾
Acre, Bolivian fine	*27	*15½	*15½
Beni, Bolivian fine	22	12	12½
Madeira fine	21¼	11¼	11½
Caucho			
Upper ball.......	14½	8	8¼
Upper ball........	*21	*13	*12
Lower ball.......	14	7½	8
Pontianak			
Pressed block.....	10½/30	12/28	11/28
Guayule			
Duro, washed and dried	16½	11½	10½
Ampar	17	12	11
Africans			
Rio Nuñez	17	13¾	13¼
Black Kassai	17	13¾	13¼
Prime Niger flake.	28	23	23
Gutta Percha			
Gutta Siak	10½	13	13
Gutta Soh.......	16¾	17	16¼
Red Macassar	1.10	1.00/1.25	1.00/1.25
Balata			
Block, Ciudad Bolivar	32	30	..
Manaos block ...	27	27	27
Surinam sheets ..	38	38	35
Amber	42	39	37

*Washed and dried crepe. Shipments from Brazil.

RUBBER SCRAP

WITH scrap rubber continuing to move slowly, the market remained quiet during May. With the exception of boot and shoe grades, all quotations are reduced from last month's levels.

CONSUMERS' BUYING PRICES
(Carload Lots Delivered Eastern Mills)
May 25, 1938

	Prices
Boots and Shoes	
Boots and shoes, black....*lb.*	$0.01 /$0.01⅛
Colored ....*lb.*	.00¾/ .00⅞
Untrimmed arctics ....*lb.*	.00¾/ .00⅞
Inner Tubes	
No. 1, floating ....*lb.*	.08½/ .09
No. 2, compound..........*lb.*	.03¼/ .03⅜
Red ....*lb.*	.03¼/ .03⅜
Mixed tubes ....*lb.*	.02¾/ .03
Tires (Akron District)	
Pneumatic Standard	
Mixed auto tires with beads ....*ton*	10.50 /10.75
Beadless ....*ton*	14.00 /14.50
Auto tire carcass......*ton*	15.00 /16.00
Black auto peelings.....*ton*	15.00 /16.00
Solid	
Clean mixed truck......*ton*	23.00 /24.00
Light gravity ....*ton*	30.00 /32.00
Mechanicals	
Mixed black scrap........*ton*	17.00 /18.00
Hose, air brake ....*ton*	16.00 /17.00
Garden, rubber covered.*ton*	11.00 /12.00
Steam and water, soft..*ton*	10.00 /10.50
No. 1 red................*lb.*	.02¼/ .02⅜
No. 2 red ....*lb.*	.01¾/ .01⅞
White druggists' sundries..*lb.*	.03⅛/ .03¼
Mechanical ....*lb.*	.01¼/ .01½
Hard Rubber	
No. 1 hard rubber........*lb.*	.10¾/ .11¼

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption¶ Tons	U. S. Stocks Mfgrs. Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.—Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1936	490,858	575,000	223,000	56,567	78,462	26,969	855,600	1,044,195	538,028
1937	584,851	543,600	262,204	63,099	57,785	44,792	1,135,029	1,093,263	633,439
1937									
January ...	32,820	50,879	204,436	55,096	71,062	36,365	71,448	**92,874	521,267
February ..	43,289	51,950	195,692	53,538	63,760	42,132	70,477	92,975	510,782
March	52,039	54,129	192,980	56,994	52,077	42,485	102,222	104,276	521,731
April	35,850	51,859	176,289	72,530	48,748	38,812	89,375	95,232	497,218
May	50,840	51,795	175,273	58,542	46,628	34,234	86,536	103,265	488,898
June	48,956	51,860	172,056	57,215	43,427	45,085	95,477	103,872	518,949
July	39,108	43,703	167,094	75,779	42,175	44,759	111,751	87,460	519,621
August	48,785	41,506	174,195	80,439	45,211	47,873	102,286	87,459	533,874
September..	56,049	43,945	186,193	83,288	49,807	49,438	106,346	89,626	545,881
October ...	52,508	38,754	200,025	80,653	51,932	41,948	100,671	85,336	551,478
November..	56,302	34,025	222,707	81,302	54,857	38,778	94,218	79,275	570,801
December...	68,305	29,195	262,204	63,099	57,785	44,792	103,722	71,613	633,439
1938									
January ...	42,135	29,429	274,581	57,356	62,108	48,494	80,282	69,198	628,827
February...	43,930	23,868	294,338	47,459	71,516	46,241	80,699	62,303	a648,259
March	35,967	30,487	299,172	41,882	76,617	50,797	81,827	74,558	......
April	30,807	27,984	301,436	39,071	......	......	......	......	......

* Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos regulated areas, and afloat. ¶Corrected to 100% from estimate of reported coverage. **Not including additional absorption from U.K. manufacturers' stocks for any month during 1937. The figure will be included in yearly total. a Japan stocks not included.

CRUDE rubber consumption by United States manufacturers during April is estimated at 27,984 long tons, against 30,487 long tons during March, 8.2% under March and 46% under the 51,859 (revised) long tons consumed in April, 1937, according to R. M. A. statistics.

Gross imports of crude rubber for April are reported at 30,807 long tons, 14.3% under the March figure of 35,967 long tons and 14.1% under the 35,850 long tons imported in April, 1937.

Total domestic stocks of crude rubber on hand April 30 are estimated at 301,436 long tons, compared with March 31 stocks of 299,172 (revised) long tons and 176,289 (revised) long tons on hand April 30, 1937.

Crude rubber afloat to United States ports as of April 30 is set at 39,071 long tons, against 41,882 long tons afloat on March 31 and 72,530 long tons afloat on April 30, 1937.

London and Liverpool Stocks

Week Ended	London (Tons)	Liverpool (Tons)
May 7...............	54,081	28,384
May 14...............	55,115	28,187
May 21...............	56,075	28,678
May 28...............	57,303	29,220

United States Latex Imports

Year	Lbs. Solids	Value
1936	44,469,504	$6,659,899
1937	51,934,040	10,213,670
1938		
Jan.	3,135,524	494,242
Feb.	3,772,897	560,883
Mar.	2,192,459	327,844
Apr.	1,991,943	295,690

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Trafalgar Sq., London, W.C.2, England, gives the following figures for April, 1938:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom	10,959	459
United States	18,342	403
Continent of Europe ..	17,202	397
British possessions	3,770	71
Japan	1,887	29
Other countries	332	13
Totals	52,492	1,372

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber (Dry Weight) Tons
Sumatra	3,379	166
Dutch Borneo	1,087	25
Java and other Dutch Islands	203	1
Sarawak	1,823	1
British Borneo	352	32
Burma	413	2
Siam	1,229	198
French Indo-China	86	81
Other countries	77	3
Totals	8,649	509

"Goodrich Chexall Accessory Blue Book." The B. F. Goodrich Co., Akron, O. 400 pages. This is a merchandising and reference manual for automobile tires, batteries, and accessories. It contains a complete listing of authentic accessory specifications and dimensions. Complete inspection, installation, and merchandising instructions for each product are also included.

COMPOUNDING INGREDIENTS

ACTIVITY in the compounding materials markets during the past month in general showed no improvement over that of April. It is expected that a definite upward change must await renewed activity in the tire industry. Prices in general remain steady and unchanged.

CARBON BLACK. The quotations on standard grade blacks remain at their previously established low levels. In the rubber trade black consumption, in line with crude rubber consumption figures, is approximately 50% of last year's figure. Total consumption of carbon black in all industries has been below production figures during the past few weeks.

FACTICE OR RUBBER SUBSTITUTE. The demand for rubber substitute continues somewhat improved over the first quarter, with prices generally unchanged.

LITHARGE. The demand for litharge was light during the past month and considerably below that of last Spring. The car lot and l.c.l. prices were reduced ½¢ per pound.

LITHOPONE. Buyers have continued to limit their orders to immediate requirements which have been small. Prices hold in an unchanged position.

RUBBER CHEMICALS. The volume of business during May was somewhat higher than that of the preceding month. Each month of this year has shown an improvement in sales over the previous month, and it is hoped that this represents a real trend which will continue. There have been no price changes of any consequence.

RUBBER SOLVENTS. The tire industry's demands have continued small. Prices for both light and heavy grades remain steady and unchanged.

STEARIC ACID. Although the price of basic material declined, this drop found no reflection in quotations on stearic acid; selling schedules were maintained at former levels. Although there has been a fair demand from makers of soaps and candles, business has been generally slow. According to official statistics, production of stearic acid during the first quarter of 1937 was 5,845,964 pounds; consumption, 2,510,996 pounds; factory and warehouse stocks at the close of March, 3,856,839 pounds.

TITANIUM PIGMENTS. Demand during the past month was only moderate and approximately the same as in April. Prices are steady and unchanged.

ZINC OXIDE. With little buying interest from the rubber industry, the demand for zinc oxides during May was light. Prices remain unchanged.

New York Quotations

May 24, 1938

Prices Not Reported Will Be Supplied on Application

Abrasives			
Pumicestone, powdered	lb.	$0.03	/$0.035
Rottenstone, domestic	lb.	.03	/ .035
Silica, 15	ton	38.00	
Accelerators, Inorganic			
Lime, hydrated, l.c.l., New York	ton	20.00	
Litharge (commercial)	lb.	.065	/ .0725
Accelerators, Organic			
A-1	lb.	.26	
A-5-10	lb.	.35	/ .40
A-7	lb.	.42	/ .55
A-10	lb.	.35	/ .40
A-11	lb.	.52	/ .65
A-19	lb.	.52	/ .65
A-32	lb.	.70	/ .80
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
A-100-F-50	lb.	.25	/ .35
A-433	lb.	.45	/ .55
Accelerator 49	lb.	.42	
808	lb.	.70	/ .72
833	lb.	1.15	
Acrin	lb.	.55	
Aldehyde ammonia	lb.		
Altax	lb.	.55	/ .70
B-J-F	lb.	.50	/ .55
Beutene	lb.	.70	/ .75
Butyl Zimate	lb.	3.00	
C-P-B	lb.	2.00	
Captax	lb.	.50	/ .60
Crylene	lb.	.40	/ .47
Paste	lb.	.30	/ .36
D-B-A	lb.	2.00	
Di-Esterex	lb.	.60	/ .70
Di-Esterex-N	lb.	.60	/ .70
DOTG	lb.	.47	
D.O.T.T.U.	lb.		
DPG	lb.	.35	/ .45
El-Sixty	lb.	.50	/ .65
Ethylideneaniline	lb.	.42	/ .43
Ethyl Zimate	lb.	3.00	
Formaldehyde P.A.C.	lb.		
Formaldehydeaniline	lb.	.31	
Formaldehyde-para-toluidine	lb.	.52	/ .54
Guantal	lb.	.40	/ .50
Hepteen	lb.	.35	/ .40
Base	lb.	1.35	/ 1.50
Hexamethylenetetramine	lb.		
Lead oleate, No. 999	lb.	.13	
Witco	lb.	.15	
Methylenedianilide	lb.		
Monex	lb.	3.00	
Novex	lb.		
O. N. V.	lb.	1.00	/ 1.10
O-X-A-F	lb.	.50	/ .55
Ovac	lb.	.50	/ .55
Pentex	lb.	1.00	/ 1.10
Pip-Pip	lb.	2.50	
Pinsolene	lb.	1.55	/ 1.85
R-2	lb.	1.40	/ 1.80
Base	lb.	3.65	
R-23	lb.	.40	
R & H 50-D	lb.	$0.42	/$0.43
Rotax	lb.	.60	/ .65
Safex	lb.	1.20	/ 1.30
Santocure	lb.	1.05	/ 1.30
Super-sulphur No. 1	lb.	.50	
No. 2	lb.	.20	/ .25
Tetrone A	lb.	3.00	
Thiocarbanilide	lb.	.24	/ .30
Thionex	lb.	3.00	
Trimene	lb.	.55	/ .65
Base	lb.	1.05	/ 1.20
Triphenyl guanidine (TPG)	lb.	60	
Tuads	lb.	3.00	
Ureka	lb.	.60	/ .75
Blend B.	lb.	.60	/ .75
C	lb.	.56	/ .65
Vulcanex	lb.	.42	/ .43
Vulcanol	lb.	.85	
Vulcone	lb.		
Z-B-X	lb.	2.50	
Z-88	lb.	.44	/ .60
Z-88-P	lb.	.51	
Zenite	lb.	.46	/ .48
A	lb.	.53	/ .55
B	lb.	.46	/ .48
Zimate	lb.	3.00	
Activator			
Barak	lb.	.50	
Age Resisters			
AgeRite Alba	lb.	1.50	/ 2.10
Exel	lb.	1.00	/ 1.40
Gel	lb.	.57	/ .77
Hipar	lb.	.65	/ .92
HP	lb.		
Powder	lb.	.52	/ .73
Resin	lb.	.52	/ .73
D	lb.	.52	/ .73
Syrup	lb.		
White	lb.	1.25	/ 1.75
Akroflex C	lb.		
Albasan	lb.	.70	/ .75
Aminox	lb.	.52	/ .61
Antox	lb.	56	
B-L-E	lb.	.52	/ .61
Powder	lb.	.65	/ .74
B-X-A	lb.	.55	/ .61
Copper Inhibitor X-872	lb.	1.15	
Flectol B	lb.	.52	/ .65
H	lb.	.52	/ .65
White	lb.	.90	/ 1.15
M-U-F	lb.	1.50	
Neozone (standard)	lb.	.63	
A	lb.	.52	/ .54
C	lb.	.52	/ .54
D	lb.	.52	/ .54
E	lb.	.63	
Oxynone	lb.	.64	/ .80
Parazone	lb.	.68	
Perflectol	lb.	.65	/ .75
Permalux	lb.	1.20	
Santoflex A	lb.	.65	/ .75
B	lb.	.52	/ .65
Santowhite	lb.	.95	/ 1.20
Solux	lb.	1.30	
Thermoflex	lb.		
A	lb.	$0.67	
V-G-B	lb.	.52	/$0.61
Alkalies			
Caustic soda, flake, Columbia (400 lb. drums)	100 lbs.	2.70	/ 3.55
liquid, 50%	100 lbs.	1.95	
solid (700 lb. drums)	100 lbs.	2.30	/ 3.15
Antiscorch Materials			
A-F-B	lb.	.35	/ .40
Antiscorch T	lb.	.90	
Cumar RH	lb.	.09	
R-17 Resin (drums)	lb.	.10	
RM	lb.	1.25	
Retarder B	lb.		
W	lb.	.36	
U.T.B.	lb.	.35	/ .40
Antisun Materials			
Heliozone	lb.	.27	
Sunproof	lb.	.27	/ .30
Brake Lining Saturant			
B. R. T. No. 3	lb.	.0165	/ .0175
Colors			
BLACK			
Lampblack (commercial)	lb.	.15	
BLUE			
Brilliant	lb.		
Prussian	lb.	.0375	
Toners	lb.	.08	/ 3.85
BROWN			
Mapico	lb.	.11	
GREEN			
Brilliant	lb.		
Chrome, light	lb.		
medium	lb.		
oxide (freight allowed)	lb.	.22	
Dark	lb.		
Guignet's, Easton, Pa., bbls.	lb.	.70	
Light	lb.		
Toners	lb.	.85	/ 3.75
ORANGE			
Lake	lb.		
Toners	lb.	.40	/ 1.60
ORCHID			
Toners	lb.	1.50	/ 2.00
PINK			
Toners	lb.	1.50	/ 4.15
PURPLE			
Permanent	lb.		
Toners	lb.	.60	/ 2.10
RED			
Antimony			
Crimson, 15/17%	lb.	.45	
R. M. P. No. 3	lb.	.48	
Sulphur free	lb.	.50	
R.M.P.	lb.	.52	
Golden 15/17%	lb.	.28	
7-A	lb.	.37	
Z-2	lb.	.23	
Aristi	lb.	1.75	

RED (*Cont'd*)
Cadmium, light (400 lb. bbls. ... lb. $0.70 / $0.75
Chinese ... lb.
Crimson ... lb.
Mapico ... lb. .0925
Medium ... lb.
Rub-Er-Red, Easton, Pa., bbls. ... lb. .0925
Scarlet ... lb.
Toners ... lb. .08 / 2.00

WHITE
Lithopone (bags) ... lb. .04⅜/ .04⅝
Albalith Black Label-11 ... lb. .04⅜/ .04⅝
Astrolith ... lb. .04⅜/ .04⅝
Azolith ... lb. .04⅜/ .04⅝
Cryptone-19 ... lb. .05⅞/ .06⅛
CB-21 ... lb. .05⅞/ .06⅛
ZS No. 20 ... lb. .09 / .0925
No. 86 ... lb. .09 / .0925
No. 230 ... lb. .09 / .0925
Sunolith ... lb. .04⅜/ .04⅝
Ray-Bar ... lb. .05¾/ .06⅜
Ray-Cal ... lb. .05¾/ .06⅜
Rayox ... lb. .16 / .19
Titanolith (5-ton lots) ... lb. .05⅞/ .06⅛
Titanox-A (50-lb. bags) ... lb. .16 / .1675
B (50-lb. bags) ... lb. .05⅞/ .06⅛
B-30 (50-lb. bags) ... lb. .05⅞/ .06⅛
C (50-lb. bags) ... lb. .05⅞/ .06⅛
Ti-Tone ... lb.
Zinc Oxide
Anaconda, Green Seal No. 333 ... lb. .08 / .085
Lead Free No. 109 ... lb. .0625/ .0675
No. 116 ... lb. .0625/ .0675
No. 352 ... lb. .075 / .08
No. 570 ... lb. .075 / .08
No. 577 ... lb. .075 / .08
Red Seal No. 222 ... lb. .075 / .08
U.S.P. No. 777 (bbls.) ... lb. .095 / .0975
White Seal No. 555 ... lb. .085 / .09
Azo ZZZ-11 ... lb. .0625/ .065
44 ... lb. .0625/ .065
55 ... lb. .0625/ .065
66 ... lb. .0625/ .065
French Process, Florence
White Seal-7 (bbls.) ... lb. .085 / .0875
Green Seal-8 ... lb. .08 / .0825
Red Seal-9 ... lb. .075 / .0775
Kadox, Black Label-15 ... lb. .065 / .0675
No. 25 ... lb. .075 / .0775
Red Label-17 ... lb. .065 / .0675
Horse Head Special 3 ... lb. .0625/ .065
XX Red-4 ... lb. .0625/ .065
23 ... lb. .0625/ .065
72 ... lb. .0625/ .065
78 ... lb. .0625/ .065
80 ... lb. .0625/ .065
103 ... lb. .0625/ .065
110 ... lb. .0625/ .065
St. Joe (lead free)
Black Label ... lb. .0625/ .065
Green Label ... lb. .0625/ .065
Red Label ... lb. .0625/ .065
U.S.P. ... lb. .095 / .0975
White Jack ... lb. .09 / .0925
Zopaque (bags) ... lb. .16 / .1675

YELLOW
Cadmolith (cadmium yellow), 400 lb. bbls. ... lb. .45 / .50
Lemon ... lb.
Mapico ... lb. .0675
Toners ... lb. 2.50

Dispersing Agents
Bardol ... lb. .0215/ .024
Darvan ... lb. .30 / .50
Nevoll (drums) ... lb. .0215
Santomerse S ... lb. .11 / .25

Fillers, Inert
Asbestine, c.l., f.o.b., mills ... ton 15.00
Barytes ... ton 30.00 /36.00
f.o.b., St. Louis (50 lb. paper bags) ... ton 22.85
off color, domestic ... ton 20.00 /25.00
white, imported ... ton 29.00 /32.00
Blanc fixe, dry, precip. ... lb. .03 / .035
Calcene ... ton 37.50 /43.00
Infusorial earth ... lb. .02 / .03
Kalite No. 1 ... ton 24.00 /50.00
No. 3 ... ton 34.00 /60.00
Magnesia, calcined, heavy ... lb. .04
Carbonate, l.c.l. ... lb. .07 / .095
Pyrax A ... ton 7.50 /20.00
Whiting
Columbia Filler ... ton 9.00 /14.00
Guilders ... 100 lbs.
Hakuenka ... lb.
Paris white, English cliffstone ... 100 lbs.
Southwark Brand, Commercial ... 100 lbs.
All other grades ... 100 lbs.
Suprex, white extra light ... ton 45.00 /60.00
heavy ... ton 45.40 /60.00
Witco, c.l. ... ton 7.00

Finishes
IVCO lacquer, clear ... gal. 1.55 / 2.55
colors ... gal. 2.60 / 3.25
Rubber lacquer, clear ... gal.
colored ... gal.
Starch, corn, pwd. ... 100 lbs.
potato ... lb.
Talc ... ton 25.00 /45.00

Flock
Cotton flock, dark ... lb. $0.12 /$0.13
dyed ... lb. .50 / .85
white ... lb. .145 / .20
Rayon flock, colored ... lb. 1.25 / 2.00
white ... lb. 1.00 / 1.25

Latex Compounding Ingredients
Accelerator 85 ... lb. .35
89 ... lb. 1.40
122 ... lb. 1.55
552 ... lb. 2.50
Aerosol ... lb. .45
Antox, Dispersed ... lb. .42
Aquarex A ... lb. .35
D ... lb. .75
F ... lb. .85
Areskap No. 50 ... lb. .18 / .24
No. 100, dry ... lb. .39 / .51
Aresket No. 240 ... lb. .16 / .22
No. 300, dry ... lb. .42 / .50
Aresklene No. 375 ... lb. .35 / .50
No. 400, dry ... lb. .51 / .65
Black No. 25, Dispersed ... lb. .22 / .40
Catalpo ... ton
Color Pastes, dispersed ... lb. .35 / 1.75
Dispersex No. 15 ... lb. .11 / .12
No. 20 ... lb. .08 / .10
Emo, brown ... lb. .15
white ... lb. .15
Factice Compound, Dispersed ... lb. .35
Heliozone, Dispersed ... lb. .25
Igepon A ... lb.
MICRONEX, Colloidal ... lb. .055 / .07
Nekal BX (dry) ... lb.
Palmol ... lb. .12
Pipsol X ... lb. 3.05 / 3.55
R-23 ... lb. .57
RN-2 ... lb. 1.40 / 1.80
S.1 (400 lb. drums) ... lb. .65
Santomerse S ... lb. .11 / .25
D ... lb. .41 / .65
Santovar A ... lb. 1.15 / 1.40
Stablex A ... lb. .90 / 1.10
B ... lb. .65 / .90
C ... lb. .40 / .50
Sulphur, Dispersed ... lb. .10 / .15
No. 2 ... lb. .075 / .15
T.1. (400 lb. drums) ... lb. .40
Tepidone ... lb. 1.75
Vulcan Colors ... lb.
Zinc oxide, Colloidal ... lb.
Dispersed ... lb. .12 / .15

Mineral Rubber
B. R. C. No. 20 ... lb. .009 / .01
Black Diamond ... ton 25.00
Genasco Hydrocarbon, granulated, (fact'y) ... ton
solid ... ton
Gilsonite Hydrocarbon (factory) ... ton
Hydrocarbon, hard ... ton 22.00 /42.00
Parmr Grade 1 ... ton 25.00 /27.00
Grade 2 ... ton 25.00 /27.00
Pioneer ... ton
285°-300° ... lb. 22.00 /42.00

Mold Lubricants
Lubrex ... lb. .25 / .30
Mold Paste ... lb. .12 / .18
Sericite ... ton 65.00 /75.00
Soapbark ... lb.
Soapstone ... ton 25.00 /35.00

Oil Resistant
AXF ... lb. .40 / .45

Reclaiming Oils
B. R. V. ... lb. .03 / .0325
S. R. O. ... lb. .0175/ .0185

Reenforcers
Carbon Black
Aerfloted Arrow Specification Black ... lb.
Arrow Compact Granulized Carbon Black ... lb.
"Certified" Heavy Compressed, Cabot ... lb.
Spheron ... lb.
Continental Dustless, c.l. ... lb. .0275/ .0375
Compressed c.l. ... lb. .0275/ .0375
Uncompressed, c.l. ... lb. .0275/ .0375
Disperso, c.l. ... lb. .0275/ .0375
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0275
c.l., delivered New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Dixiedensed, c.l., f.o.b., New Orleans, La., Galveston or Houston, Tex. ... lb. .0275
c.l., delivered New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Dixiedensed 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0275
c.l., delivered New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Excello, c.l., f.o.b. Gulf ports ... lb. .0275/ .0475
delivered New York ... lb. .0375/ .0575
l.c.l., delivered New York ... lb. .0625/ .07
Fumonex, c.l., f.o.b. works ... lb. $0.03
ex-warehouse ... lb. .045
Gastex ... lb. .03 /$0.07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0275
c.l., delivered New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Kosmobile 66, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0275
c.l., delivered New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0275
c.l., delivered New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
MICRONEX Beads, c.l., f.o.b. Gulf ports ... lb. .0275
c.l., delivered, New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Mark II, c.l., f.o.b. Gulf ports ... lb. .0275
c.l., delivered, New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
Standard, c.l., f.o.b. Gulf ports ... lb. .0275
c.l., delivered, New York ... lb. .0375
local stock, bags, delivered ... lb. .0625
W-5, c.l., f.o.b., Gulf ports ... lb. .0275
c.l., delivered, New York ... lb. .0375
local stock, bags, delivered ... lb. .0375
W-6, c.l., f.o.b., Gulf ports ... lb. .0625
c.l., delivered, New York ... lb. .0275
local stock, bags, delivered ... lb. .0625
York ... lb.
Paradene No. 2 (drums) ... lb. .04
Pelletex ... lb. .03 / .07
Supreme, c.l., f.o.b. Gulf ports ... lb. .0275/ .0475
delivered New York ... lb. .0375/ .0575
l.c.l. delivered New York ... lb. .0625/ .07
"WYEX BLACK" ... lb.
Carbonex (bags) ... lb. .029 / .0315
"S" (bags) ... lb. .0315/ .034
Clays
Aerfloted Paragon (50 lb. bags) ... ton 9.50
Suprex (50 lb. bags) ... ton 9.50
China ... ton 17.50 /20.00
Dixie ... ton 11.00 /30.00
Junior ... ton 9.50 /29.00
McNamee ... ton 9.50 /22.00
Par ... ton 9.50 /22.00
Witco, f.o.b. Works ... ton 9.50
Cumar EX ... lb. .035
P-33 ... lb. .0475/ .0775
Thermax ... lb. .0175/ .05
Velvetex ... lb. .03 / .045

Reordorants
Amora A ... lb.
B ... lb.
C ... lb.
D ... lb.
Curodex 19 ... lb. 2.75
188 ... lb. 3.50
198 ... lb. 4.50
Rodo No. 0 ... lb. 3.50 / 4.00
No. 10 ... lb. 4.50 / 5.00

Rubber Substitutes
Black ... lb. .07 / .135
Brown ... lb. .085 / .14
White ... lb. .085 / .1525
Factice
Amberex ... lb. .20
Brown ... lb. .085 / .145
Neophax A ... lb. .1075
B ... lb. .1075
Fac-Cel B ... lb. .1625
C ... lb. .1625
White ... lb. .085 / .1525

Softeners
Bondogen ... lb. .98 / 1.65
Burgundy pitch ... lb. .06
Cycline oil ... gal. .14 / .20
Nuba resinous pitch (drums)
Grades No. 1 and No. 2 ... lb. .03
Grade No. 3 ... lb. .04
Palm oil (Witco), c.l. ... lb. .0575
Pine tar ... gal.
Plastogen ... lb. .0775/ .125
Plastone ... lb. .30 / .35
R-19 Resin (drums) ... lb. .10
R-21 Resin (drums) ... lb. .10
Reogen ... lb. .115 / .30

(*Continued on page* 102)

COTTON AND FABRICS

New York Cotton Exchange Week-End Closing Prices

Futures	Mar. 26	Apr. 30	May 7	May 14	May 21	May 28
Apr.	8.68	....	....	....	....	....
May	....	8.75	8.63	....	....	....
June	....	8.76	8.65	8.69	8.49	7.89
July	8.79	8.78	8.67	8.72	8.52	7.92
Sept.	8.82	8.84	8.68	8.76	8.56	7.92
Dec.	8.87	8.86	8.72	8.81	8.62	7.94
Mar.	....	8.94	8.81	8.90	8.68	7.97
Apr.	....	....	....	8.91	8.70	8.00

New York Quotations

May 25, 1938

Drills	
38-inch 2.00-yard... *yd.*	$0.10¾
40-inch 3.47-yard	.06½
50-inch 1.52-yard	.14½
52-inch 1.85-yard	.12⅛
52-inch 1.90-yard	.11¼
52-inch 2.20-yard	.10¼
52-inch 2.50-yard	.09
59-inch 1.85-yard	.11½
Ducks	
38-inch 2.00-yard D. F.... *yd.*	.11
40-inch 1.45-yard S. F.	.15½
51½-inch 1.35-yard D. F.	.16¼
72-inch 1.05-yard D. F.	.22
72-inch 17.21-ounce	.24
Mechanicals	
Hose and belting... *lb.*	.24
Tennis	
52-inch 1.35-yard... *yd.*	.16¾
Hollands	
Gold Seal and Eagle	
20-inch No. 72... *yd.*	.09
30-inch No. 72	.16
40-inch No. 72	.18
Red Seal and Cardinal	
20-inch... *yd.*	.07½
30-inch	.13¾
40-inch	.15
50-inch	.24
Osnaburgs	
40-inch 2.34-yard... *yd.*	.09⅝
40-inch 2.48-yard	.09
40-inch 2.56-yard	.08½
40-inch 3.00-yard	.07⅛
40-inch 7-ounce part waste	.06⅞
40-inch 10-ounce part paste	.10
37-inch 2.42-yard	.09¼
Raincoat Fabrics	
Cotton	
Bombazine 60 x 64... *yd.*	.07½
Plaids 60 x 48	.10½
Surface prints 60 x 64	.11½
Print cloth, 38½-inch, 60 x 64.	.04⅝
Sheetings, 40-inch	
48 x 48, 2.50-yard... *yd.*	.07⅛
64 x 68, 3.15-yard	.07
56 x 60, 3.60-yard	.06
44 x 40, 4.25-yard	.04¾
Sheetings, 36-inch	
48 x 48, 5.00-yard... *yd.*	.04¼
44 x 40, 6.15-yard	.03¼
Tire Fabrics	
Builder	
17¼ ounce 60" 23/11 ply Karded peeler... *lb.*	.29½
Chafer	
14 ounce 60" 20/8 ply Karded peeler... *lb.*	.29½
9¼ ounce 60" 10/2 ply Karded peeler... *lb.*	.28½
Cord Fabrics	
23/5/3 Karded peeler, 1 1/16" cotton... *lb.*	.30½
15/3/3 Karded peeler, 1 1/16" cotton... *lb.*	.28½
23/5/3 Karded peeler, 1¼" cotton... *lb.*	.36
23/5/3 Combed Egyptian... *lb.*	.49½
Leno Breaker	
8¼ ounce and 10¼ ounce 60" Karded peeler... *lb.*	.31½

THE accompanying table of week-end closing prices on the New York Cotton Exchange shows the week-end change of representative futures covering the past two months.

The New York spot middling price closed at 8.67¢ per pound on May 2, a decline of 11 points from the previous close. The price moved within a narrow range during the first two weeks in May, closing at 8.65¢ on May 18. Thereafter the price suffered a sharp break. Under the impact of heavy foreign selling, the market declined to 8.37¢ on May 24. The closing price on May 31 was 7.71¢ per pound.

Sales at 13 southern markets totaled 51,713 bales during 19 days since May 2, as compared with 38,571 bales for the same days one year ago.

Consumption of all cotton in domestic mills totaled 414,392 bales during April, against 510,941 in March, and 718,975 in April, 1937, according to the report of the Census Bureau. April consumption was the smallest for that month since 1932, when it reached 366,000.

Fabrics

The fabrics markets were fairly active during May. The demand, however, has been spotty with some types of cloths in greater demand than others. With the fall raincoat business just starting, it is expected that this market will increase its activity in the near future.

Prices are generally easier with the reductions covering a broad range and being limited chiefly to a fraction of a cent.

RECLAIMED RUBBER

ACCORDING to R. M. A. figures, April reclaimed rubber consumption is estimated at 7,480 long tons, a decrease of 13% from the March figure; production, 6,399 long tons; and stocks on hand April 30, 23,339 long tons. The demand for reclaim during the past month showed a slight improvement over April. Reclaimers, however, do not look for a marked betterment in conditions until activity in the automotive industry once again has been resumed.

The market continues steady; the quotations on all grades with two exceptions remain at last month's levels. White reclaim receded 1¢ per pound; while compounded tubes, which were quoted at 9 to 9¾¢ per pound, are now 9 to 9½¢ per pound.

New York Quotations

May 25, 1938

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6¼/ 6½
Acid	1.18-1.22	7¼/ 7½
Shoe		
Standard	1.56-1.60	7 / 7¼
Tubes		
No. 1 Floating	1.00 -	14 /14¼
Compound	1.10-1.20	9 / 9½
Red Tube	1.15-1.30	9 / 9½
Miscellaneous		
Mechanical Blends	1.25-1.50	4¼/ 5
White	1.35-1.50	12 /12½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption†	Consumption % to Crude	U. S. Stocks*	Exports
1936	150,571	141,486	24.6	19,000	7,085
1937	185,033	162,000	29.8	28,800	13,233
1938					
Jan.	7,698	6,940	23.6	28,900	658
Feb.	6,198	7,141	29.9	27,487	470
Mar.	6,875	8,471	27.8	25,432	459
Apr.	6,399	7,480	26.7	23,339	...

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage.
Compiled by The Rubber Manufacturers Association, Inc.

U. S. Crude and Waste Rubber Imports for 1938

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Totals 1938	Totals 1937	Balata	Miscellaneous	Waste
Jan. ... *tons*	39,744	1,259	411	177	6	538	42,135	32,820	41	526	8
Feb.	41,709	1,400	453	150	..	218	43,930	43,289	35	808	22
Mar.	34,252	861	371	278	..	205	35,967	52,039	37	555	93
Apr.	29,662	690	324	...	1	130	30,807	35,850	73	1,046	33
Total 4 mos., 1938... *tons*	145,367	4,210	1,559	605	7	1,091	152,839	.....	186	2,935	156
Total 4 mos., 1937... *tons*	152,514	7,071	3,361	308	53	691	.....	163,998	77	2,860	1,089

Compiled from The Rubber Manufacturers Association, Inc., statistics.

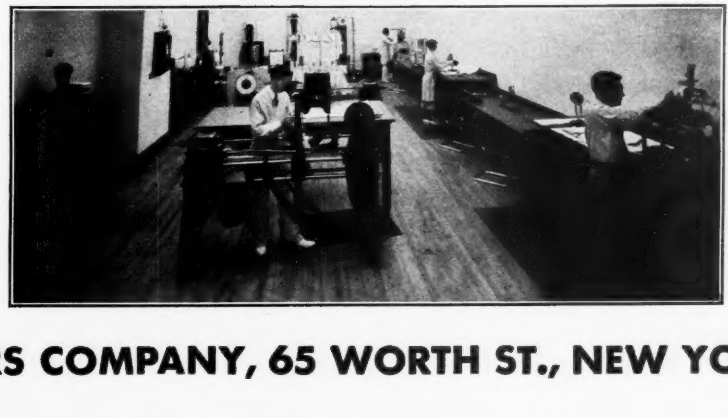
FABRICS FOR THE RUBBER INDUSTRY

A plain case of INTESTINAL FABRICITIS

In other words, this belt collapsed under strain because the fabric of its body couldn't stand the gaff. It inherited a weak constitution—its ancestry was unsound. For over 20 years, we have maintained the most unique hospital clinic in America. The patients—thousands of them from all over the world—are broken down belts.

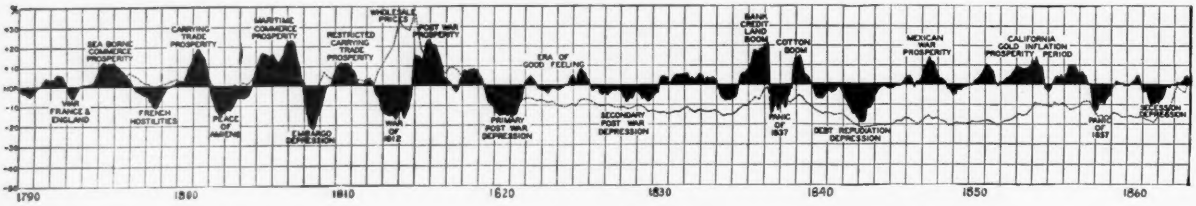
Specialists examine and study every case and from the resulting data at the Belt Hospital, are able to develop a sturdy, rugged line of belt ducks for the rubber industry.

Our Belt Hospital is just one more example of the practical thoroughness of our experience and service. We welcome the opportunity to work with rubber engineers toward the solution of their fabric problems.



WELLINGTON SEARS COMPANY, 65 WORTH ST., NEW YORK

American Business Activity fr



This chart, prepared by The Cleveland Trust Co., indicates a more or less regular recurrence of depression periods during the last 147 years. The law of averages is quite well exemplified until the occasion of the present depression which has outstripped its predecessors manifold in duration and depth.

Business activity is represented by the black areas and expressed as percentage above or below normal. The index for the period 1790 to 1855 is based on ten specific business activities indicative of that period; and for the period 1855 to 1901 ten other representative activities are used. Normal values for each period are means between one set of lines running from one prosperity peak to the next, and another similar set of lines running from each depression bottom to the next. The figures from 1901 to 1919 are those of the Thomas index of manufacturing production with mineral production added, and from 1919 to date the figures of the Federal Reserve index of industrial production have been used. All the data were reduced to a per capita basis.

The dashed line represents the changes in wholesale commodity prices. The index used is that of Professors Warren and Pearson (Cornell), recomputed so that the average for 1929 equals 100. This series was used from 1798 to date. From 1795 to 1798 the Smith series was used, and from 1790 to 1795 a British price index was used.

Tire Production Statistics

Pneumatic Casings

	Inventory	Production	Shipments
1935	8,195,863	49,338,157	50,176,898
1936	11,114,399	58,116,349	55,362,739
1937	10,767,799	55,284,415	55,466,329
1938			
Jan.	10,987,967	2,743,174	2,489,589
Feb.	10,833,036	2,211,689	2,348,949
Mar.	10,808,419	2,759,135	2,877,660
Apr.	12,628,872	5,729,869	5,560,453

Inner Tubes

	Inventory	Production	Shipments
1935	8,231,351	47,650,811	47,998,054
1936	10,985,273	57,247,553	54,624,321
1937	10,235,517	51,986,167	52,376,657
1938			
Jan.	10,198,198	2,387,858	2,342,452
Feb.	10,161,093	2,105,299	2,106,620
Mar.	10,092,923	2,444,436	2,519,594
Apr.	12,218,374	5,626,849	5,325,486

Source: The Rubber Manufacturers Association, Inc. Figures adjusted to represent 100% of the industry.

New York Quotations

(Continued from page 98)

Softeners (*Cont'd*)		
Rosin oil, compounded	*gal.*	$0 40
RPA No. 1	*lb.*	.65
No. 2	*lb.*	.65
Rubtack	*lb.*	.10
Tackol	*lb.*	.085 /$0.18
Tonox D	*lb.*	.75 / .85
Witco No. 20	*gal.*	.20
X-1 Resinous oil (tank car)	*lb.*	.01
Softeners for Hard Rubber Compounding		
Resin C Pitch 55° C. M.P.	*lb.*	.013 / .014
Resin C Pitch 70° C. M.P.	*lb.*	.013 / .014
Resin C Pitch 85° C. M.P.	*lb.*	.013 / .014
Solvents		
Beta-Trichlorethane	*gal.*	
Carbon bisulphide	*lb.*	
tetrachloride	*lb.*	
Industrial 90% benzol (tank car)	*gal.*	.16
Stabilizers for Cure		
Laurex, ton lots	*lb.*	.13 / .15
Stearex B	*lb.*	.105 / .115
Beads	*lb.*	.095 / .105
Stearic acid, single pressed	*lb.*	.105 / .115
Stearite	100 *lbs.*	9.50 /10.50
Zinc stearate	*lb.*	.23
Synthetic Rubber		
Neoprene Type E	*lb.*	.75
G	*lb.*	.80
H	*lb.*	.80
M	*lb.*	.80
Latex Type 50	*lb.*	.35
55	*lb.*	.35
56	*lb.*	.35
"Thiokol" A (f.o.b. Yardville)	*lb.*	.35
Coating materials	*gal.*	2.50 / 5.00
DX	*lb.*	.55
Molding Powder	*lb.*	.50 / .75
Tackifier		
B. R. H. No. 2	*lb.*	.015 / .016
Varnish		
Shoe	*gal.*	1.45
Vulcanizing Ingredients		
Sulphur		.035 / .04
Chloride, drums	*lb.*	
Rubber	100 *lbs.*	2.65
Telloy	*lb.*	2.00
Vandex	*lb.*	2.00
(See also Colors—Antimony)		
Waxes		
Carnauba, No. 3 chalky	*lb.*	.37½
2 N.C.	*lb.*	.39½
3 N.C.	*lb.*	.37½
1 Yellow	*lb.*	.4575
2	*lb.*	.4425
Montan, crude	*lb.*	.11

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

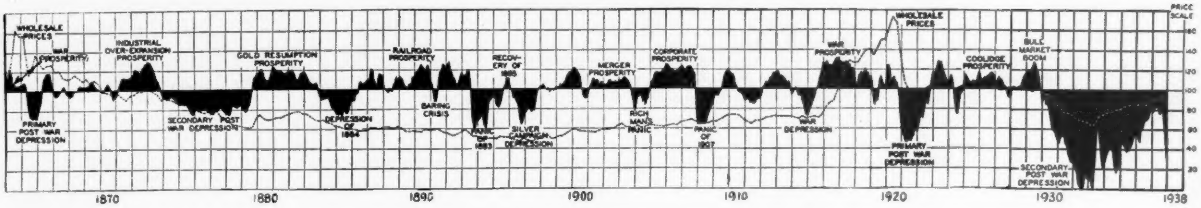
No.	Inquiry
2459	Manufacturer of sponge rubber.
2460	Manufacturer of latex sponge.
2461	Suppliers of latex and rubber sponge thread.
2462	Manufacturer of rubber for table tennis paddles.
2463	Manufacturer of all-rubber sheeting for export.
2464	Manufacturer of rubber stoppers for medicine bottles.
2465	Manufacturer of "Malaboza Gum Belting."
2466	Supplier of "Stoddard Solvent."
2467	Manufacturer of Geer testing oven.
2468	Manufacturer of machinery to cut old tires into strips for doormat making.
2469	Manufacturer of rubber cements for joining ducks.
2470	Supplier of heavy ducks.
2471	Supplier of rubber.
2472	Supplier of sulphur chloride.
2473	Manufacturer of rubber tires to fit over the steel wheels of lawn mowers.
2474	Supplier of rubber or tin numerals for use on retreaded tires as a means of identification.
2475	Supplier of hollow cores and of filled liquid centers for golf balls.
2476	Manufacturer of rubber door knob cover.
2477	Supplier of cut tire pieces from which link mats are made.

Argentina's Use of Automobile Increases

The expanding adoption of the automobile and consequently rubber tires is indicated by the interest demonstrated in the recent 1938 automobile show at Buenos Aires. In terms of models and makes this exhibit exceeded the National Automobile Show held in New York last fall by more than two to one. Five hundred models of 59 makes included 37 passenger car and 22 truck makes. At the New York show were displayed 20 makes of passenger car and seven different trucks. According to a survey published recently by the Pan American Union, automotive exports from the United States to Argentina increased from $3,245,106 in 1932 to $15,895,499 in 1936, or nearly five times. The government is carrying forward a large road-building program. Road mileage in the republic increased from 140,008 existing in 1935 to 213,779 at the end of 1936. In addition to the most extensive highway system of all Latin American republics, Argentina has the greatest number of automobiles. At the end of 1937, Argentina had 247,970 automobiles, and Brazil ranked second with 144,000.

These statistics indicate a rapidly-growing acceptance of the automobile in Argentina and a potential market for automobile tires and tubes as replacements.

ity from 1790 to 1937 Inclusive



Water-Resistant Floor Wax

Hornglaze wax, a water-emulsion wax for linoleum, rubber, cork, asphalt-tile, and hardwood floors, dries bright to a highly water-resistant film 15 to 20 minutes after application and does not require polishing. The wax is said to seal the pores and provide a hard, dry, non-slippery film which prevents the embedding of dirt. Elastic enough to be self-healing, according to the manufacturer, it will not scuff white or become brittle; neither will it remain soft and tacky.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Boston Woven Hose & Rubber Co.	Pfd.	$3.00 s.	June 15	June 1
De Vilbiss Co.	7% Pfd.	$0.17½ q.	Apr. 15	Mar. 31
Detroit Gasket & Mfg. Co.	Pfd.	$0.30	June 1	May 14
Dunlop Rubber Co. ADR ord. (reg.)	Com.	$0.33 final	Apr. 27	Mar. 23
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	June 1	May 15
Fisk Rubber Co.	Pfd.	$1.50 q.	Apr. 20	Apr. 11
General Electric Co.	Com.	$0.30 q.	Apr. 25	....
Goodyear Tire & Rubber Co.	$5 Pfd.	$1.25 q.	June 15	May 16
Mid-West Rubber Reclaiming Co.	$4 Pfd.	$1.00 q.	June 1	May 21
Okonite Co.	Com.	$1.50	May 2	Apr. 15
Okonite Co.	6% Pfd.	$1.50 q.	June 1	May 19
Pharis Tire & Rubber Co.	Com.	$0.15 resumed	May 20	May 5
Raybestos-Manhattan, Inc.	Com.	$0.15 reduced	June 15	May 31
Rubber Co. of Amsterdam	Com.	15 guilders final	....	....
United Elastic Corp.	Com.	$0.10	June 24	June 3
Westinghouse Electric & Mfg. Co.	Com.	$0.50 reduced	May 27	May 10
Westinghouse Electric & Mfg. Co.	Pfd.	$0.75 reduced	May 27	May 10
S. S. White Dental Mfg. Co.	Com.	$0.30 q.	May 16	Apr. 30

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.†	Australia	Belgium	Canada	Czecho-slovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1936	475,300	62,700	14,400	9,600	27,900	8,800	56,800	71,800	16,000	61,700	31,000	64,600	831,100
1937	592,528	137,351	19,257	14,969	36,087	13,063	59,959	98,170	23,980	62,205	30,462	67,745	1,110,856
1937													
Jan.	42,665	3,855	590	854	1,632	567	4,701	7,041	1,762	8,298	2,633	5,959	76,460
Feb.	44,408	6,081	331	1,363	1,271	837	5,276	7,911	1,477	6,605	3,048	5,068	77,373
Mar.	39,897	7,197	1,293	1,641	2,612	601	5,130	7,668	1,999	6,914	3,598	6,172	77,868
Apr.	42,076	9,871	1,058	1,069	1,343	1,445	5,302	8,664	1,589	5,808	1,532	5,843	79,537
May	48,517	8,488	1,287	2,113	4,187	925	5,619	6,706	2,745	8,597	1,886	6,244	94,926
June	48,983	10,437	2,258	1,630	3,790	1,150	6,022	6,469	1,745	7,608	3,940	6,127	94,879
July	43,028	13,854	1,959	851	1,946	754	4,315	7,860	2,662	4,869	2,150	5,865	86,887
Aug.	49,496	18,483	2,114	1,013	3,506	1,692	4,499	8,752	2,447	4,411	1,226	5,553	100,466
Sept.	56,698	16,654	3,104	1,258	2,396	1,369	4,830	10,595	1,941	3,671	1,391	5,578	108,502
Oct.	52,938	15,091	2,510	966	5,998	988	4,286	8,076	939	2,060	3,725	5,457	99,841
Nov.	54,146	14,794	1,944	925	4,787	845	4,231	8,848	2,790	1,368	3,726	4,756	101,244
Dec.	69,676	12,546	809	1,286	2,619	1,890	5,748	9,580	1,884	1,996	1,607	5,123	112,873
1938													
Jan.	45,596	17,811	617	1,258	1,789	1,102	4,780	6,314	1,809	4,935	2,000*	5,292	90,950
Feb.	40,977	19,149	621	974	615	1,771	5,420	6,959	2,000	3,173	2,000*	5,310	86,325

*Estimated. †U. K. figures show gross imports, not net imports. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Total	Philippines and Oceania	Africa	South America	Mexican Guayule	Grand Total
1936	353,700	309,600	49,700	8.600	5,800	8,200	21,000	34,600	40,800	832,000	1,600*	6,100	14,700	1,200	855,600
1937	469,960	431,646	70,359	9,777	7,232	13,213	25,922	35,551	43,374	1,107,034	1,617	7,678	16,008	2,692	1,135,029
1937															
Jan.	24.746	27.038	4,514	487	579	1,234	4,015	3,849	2.825	69.287	80	635	1,286	160	71,448
Feb.	24.138	26.711	5,603	1,033	843	790	2,015	3,554	3.078	67,765	180	537	1,789	206	70,477
Mar.	40.138	40.710	7,049	885	1,149	1,239	1,425	3.873	3,173	99,641	181	472	1,792	136	102,222
Apr.	41.696	32.903	3,419	627	559	783	2,960	1,899	2.095	86.941	124	574	1,546	190	89.375
May	33.929	38.360	4.607	445	562	778	742	2,238	2,862	84,523	98	676	1,057	182	86,536
June	31.376	46.753	5,149	662	430	813	1,890	2.933	3,673	93,679	117	621	915	145	95,477
July	45.900	43.617	6,279	703	263	1,414	2,543	3.175	5.563	109.457	111	872	940	371	111,751
Aug.	43.284	40.438	7,308	471	134	1,189	1,624	2.999	2,277	99,724	187	726	1,314	335	102,286
Sept.	48.515	38.306	5,804	944	148	969	2,659	3,173	4.131	104.649	140	668	1,060	329	106.846
Oct.	47.586	34.416	6.701	994	254	1,505	523	2,352	3.753	98.084	99	708	1,533	247	100,671
Nov.	45.598	29.107	4.394	1.228	907	1.327	2.517	2.549	4.556	92.183	159	642	983	251	94.218
Dec.	43.054	33.287	9,532	1.298	1.404	1,172	3,009	2,957	5.388	101.101	141	547	1,793	140	103,722
1938															
Jan.	30,998	26,468	5,222	841	538	1,307	3,485	2,897	6,088	77,844	138	824	938	538	80,282
Feb.	37,166	27,362	5,216	639	770	918	8	3,266	3,070	78,415	125	600*	1,341	218	80,699
Mar.	33,547	31,881	3,802	544	703	853	1,564	2,837	3,213	78,944	150*	600*	1,883	250*	81,827

*Estimated. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Rubber Goods Production Statistics

		1938 Feb.	1937 Feb.
TIRES AND TUBES			
Pneumatic casings:			
Production	*thousands*	2,212	5,246
Shipments, total	*thousands*	2,349	4,371
Domestic	*thousands*	*	4,276
Stocks, end of month	*thousands*	10,833	12,308
Inner Tubes:			
Production	*thousands*	2,105	5.091
Shipments, total	*thousands*	2,107	4,536
Domestic	*thousands*	*	4,469
Stocks, end of month	*thousands*	10,161	11,734
Raw material consumed:			
Fabrics	*thous. of lbs.*	....	23,426
MISCELLANEOUS PRODUCTS			
Single and double texture proofed fabrics:			
Production	*thous. of yds.*	2,088	4,342
Rubber and canvas footwear:			
Production, total	*thous. of prs.*	3,639	5,935
Tennis	*thous. of prs.*	2,251	3,241
Waterproof	*thous. of prs.*	1,388	2,694
Shipments, total	*thous. of prs.*	3,212	4,520
Tennis	*thous. of prs.*	2,422	3,308
Waterproof	*thous. of prs.*	789	1,212
Shipments, domestic, total	*thous. of prs.*	3,174	4,486
Tennis	*thous. of prs.*	2,392	3,291
Waterproof	*thous. of prs.*	782	1,195
Stocks, total, end of month	*thous. of prs.*	20,296	14,869
Tennis	*thous. of prs.*	6,796	5,041
Waterproof	*thous. of prs.*	13,499	9,829

* Data not available.
The above figures have been adjusted to represent 100% of the industry based on reports received which represented 81% for 1936-37.
Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

U. S. Golf Ball Imports

For Consumption, March, 1938

	United Kingdom		All Other		Total	
1937	No.	$	No.	$	No.	$
Oct.	41,856	3,874	...	...	41,856	3,874
Nov.	24	8	24	6	48	14
Dec.	28,296	1,858	36	12	28,332	1,870
1938						
Jan.	15,312	1,355	24	7	15,336	1,362
Feb.	99,792	7,431	300	113	100,092	7,544
Mar.	104,664	9,764	...	...	104,664	9,764

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	Commodity	City and Country
†6,052	Novelties	Beirut, Syria
*6,055	Novelties	Amsterdam, Netherlands
†6,059	Toys	Sudbury, Canada
*6,064	Toys	Habana, Cuba
†6,067	Cotton duck for rubber shoes	Singapore, S. S.
†6,073	Hard rubber in tubes and rods	Olomouc, Czechoslovakia
*6,091	Automobile accessories	Halifax, Nova Scotia
*6,107	Storage batteries	Durban, South Africa
‡6,109	Office supplies	Kuala Lumpur, F. M. S.
‡6,112	Novelties	Trinidad, West Indies
*6,131	Mechanical rubber goods	Habana, Cuba
*6,136	Druggists' sundries and sheeting	Cairo, Egypt
†6,142	Balloons	Rangoon, Burma
†6,143	Rubber bathing suits	Minehead, England
†6,145	Toys and airplane models	Calcutta, India
†6,153	Elastic fabrics, girdles, etc.	Prague, Czechoslovakia
†6,166	High-pressure hose	Cairo, Egypt
*6,188	Batteries	Casablanca, Morocco
*6,202	Automobile accessories and parts	Batavia, Java
*6,205	Surgeons' rubber goods	Nairobi, East Africa
*6,214	Tennis balls	Manila, Philippine Islands
†6,228	Sport and stationery goods	Bangkok, Siam
*6,240	Balloons	Istanbul, Turkey
*6,242	Toys and novelties	Belize, Honduras
*6,246	Automobile accessories and parts, storage batteries, rubberized fabrics	Casablanca, Morocco
‡6,249	Druggists' sundries	Zagreb, Yugoslavia
‡6,260	V-belting	Teplice, Czechoslovakia
*6,264	Automobile accessories	Sydney, Australia
†6,269	Office sundries	London, England
‡6,275	Bathing shoes	Buenos Aires, Argentina
‡6,279	Toys	Toronto, Canada
*6,282	Office and school supplies	Guatemala, Guatemala
‡6,283	Toys and games	Alexandria, Egypt
*6,285	Office appliances and erasers	Istanbul, Turkey
†6,306	Office supplies	Nairobi, East Africa
‡6,307	Office equipment novelties	London, England
*6,313	Automobile accessories	Toronto, Canada
*6,324	Office supplies	Montevideo, Uruguay
*6,346	Rubber-lined fire hose	Sao Paulo, Brazil
†6,354	Rubber for manufacture of tires and tubes and rubber tire and tube manufacturing machinery	Lisbon, Portugal
*6,365	Rubber reducing corsets	Helsinki, Finland
‡6,367	Office supplies	Toronto, Canada
*6,371	Automobile accessories	Rio de Janeiro, Brazil
*6,373	Toys	Manzanillo, Mexico
*6,422	Footwear and automobile accessories	London, England
†6,424	Novelties in household articles	Paris, France
*6,427	Druggists' sundries	Alexandria, Egypt
*6,432	Technical rubber supplies	Johannesburg, South Africa
†6,439	Elastic webbing	London, England
†6,455	Rubber compounding ingredients and colors	Tientsin, China

*Agency. †Purchase. ‡Purchase and agency.

Rims Approved by The Tire & Rim Association, Inc.

	3 Mos., 1938		3 Mos., 1937	
Rim Size	No.	%	No.	%
Drop Center Rims, 16" Diameter and Under				
16x4.00D	3,227	0.2	1,563	0.0
16x4.25D	......	..	148,336	2.4
16x4.50D	......	..	931	0.0
15x3.00D	13,019	0.7	22,850	0.4
15x5.50F	28,690	1.6	45,475	0.7
16x3.50D	123,828	6.7	696,943	11.0
16x4.00E	767,695	41.3	2,457,522	39.0
16x4.25E	43,914	2.4	261,114	4.1
16x4.50E	231,395	12.4	1,067,566	16.9
16x5.00F	85,121	4.6	265,016	4.2
16x5.50F	53,978	2.9	33,371	0.5
16x6.00F	5,882	0.3	8,755	0.1
Semi-Drop Center Rims, 16" Diameter				
16x4.50E	6,119	0.3	......	..
16x5.50F	10,572	0.5	......	..
Drop Center Rims, 17" and Over				
17x3.00D	......	..	2,957	0.0
17x3.25E	2,507	0.1	5,338	0.0
17x3.62F	......	..	7,770	0.1
17x4.19F	......	..	959	0.0
17x5.00F	167	0.0	3,089	0.0
18x2.15B	2,942	0.2	4,295	0.1
18x3.00D	712	0.0	......	..
18x3.25E	1,054	0.1	2,701	0.0
18x3.62F	4,547	0.3	9,989	0.2
18x4.00F	......	..	141	0.0
18x4.19F	2,513	0.1	6,086	0.1
19x2.15B	......	..	1,405	0.0
19x3.00D	......	..	2,703	0.0
19x3.25E	......	..	269	0.0
19x3.62F	......	..	3,383	0.1
20x3.25E	1,707	0.1	5,208	0.1
21x3.25E	805	0.0	3,152	0.0
Flat Base Passenger Rims				
All Sizes	357	0.0	4,787	0.1

	3 Mos., 1938		3 Mos., 1937	
Rim Size	No.	%	No.	%
High Pressure Passenger Rims				
All Sizes	232	0.0	......	..
Clincher Rims				
All Sizes	......	..	539	0.0
15" Truck Rims				
15x7	944	0.0	1,120	0.0
15x8	631	0.0	92	0.0
17" Truck Rims				
17x5	37,149	2.0	......	..
17x6	10,058	0.5	......	..
18" Truck Rims				
18x6	......	..	1,455	0.0
18x7	5,865	0.3	11,441	0.2
18x8	4,553	0.3	1,390	0.0
18x9/10	1,125	0.1	1,724	0.0
20" Truck Rims				
20x5	53,307	2.9	356,103	5.6
20x6	148,255	8.0	556,725	8.8
20x7	52,094	2.9	125,919	2.0
20x8	10,181	0.5	60,190	1.0
20x9/10	6,365	0.3	8,580	0.1
20x11	1,072	0.1	711	0.0
22" Truck Rims				
22x7	......	..	61	0.0
22x8	2,647	0.1	5,206	0.1
22x9/10	402	0.0	873	0.0
24" Truck Rims				
24x6	388	0.0	198	0.0
24x7	858	0.0	922	0.0
24x8	2,448	0.1	5,267	0.1
24x9/10	2,050	0.1	4,112	0.1
24x11	541	0.0	115	0.0

	3 Mos., 1938		3 Mos., 1937	
Rim Size	No.	%	No.	%
Drop Center Tractor and Implement Rims				
12x3.00D	2,057	0.1	......	..
15x3.00D	3,253	0.2	......	..
16x3.00D	532	0.0	......	..
16x6.00F	6,643	0.4	......	..
18x3.00D	777	0.0	......	..
18x5.50F	1,799	0.1	570	0.0
20x4.50E	753	0.0	4,330	0.1
20x5.50F	3,862	0.2	1,566	0.0
21x3.00D	370	0.0	881	0.0
22x4.50E	1,158	0.1	871	0.0
24x5.50R	8,208	0.4	......	..
28x4.00D	44	0.0	......	..
32x5.50R	11	0.0	......	..
36x3.00D	495	0.0	......	..
36x4.50E	......	..	226	0.0
36x5.50R	624	0.0	......	..
40x5.50R	3,558	0.2	......	..
20x8.00T	156	0.0	......	..
24x6.00S	2,308	0.1	6,851	0.1
24x8.00T	25,094	1.4	20,040	0.3
28x6.00S	576	0.0	101	0.0
28x8.00T	11,853	0.6	16,018	0.3
32x8.00T	1,421	0.1	1,253	0.0
36x6.00S	18,015	1.0	21,347	0.3
36x8.00T	28,555	1.5	14,334	0.2
40x6.00S	4,886	0.3	5,909	0.1
42x8.00T	......	..	216	0.0
44x8.00T	52	0.0	......	..
Cast Rims				
10x5.00F	495	0.0	777	0.0
10x6.00F	35	0.0	213	0.0
15x3.00D	......	..	158	0.0
24x15	24	0.0	121	0.0
Totals	1,859,530	..	6,312,199	..

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

RESEARCH DIRECTOR WITH TEN YEARS' EXPERIENCE IN development and manufacture of latex products. Age 36. Ch.E. and M.S. (1927). Desires responsible position, preferably as specialist in latex thread and latex wire insulation. Has many original suggestions, is capable of handling any latex problem, and is efficient in handling labor. Address Box No. 962, care of INDIA RUBBER WORLD.

CHEMIST-COMPOUNDER. AGE 31. OVER FIVE YEARS' EXPERIence in heels, soles, cements, and canvas footwear. Ability to handle factory problems. Address Box No. 963, care of INDIA RUBBER WORLD.

LATEX CHEMIST, SEVERAL YEARS' EXPERIENCE ON LATEX products. Excellent references. Address Box No. 965, care of INDIA RUBBER WORLD.

LATEX CHEMIST, NOW EMPLOYED AT DEVELOPMENT, COMpounding, and control, desires change. Full particulars to interested concern. Address Box No. 967, care of INDIA RUBBER WORLD.

FOREMAN OR CHEMIST. CAN PRODUCE HIGH-GRADE RUBber-covered wires and cables, all types, with a minimum of waste. Address Box No. 969, care of INDIA RUBBER WORLD.

SUPERINTENDENT: PRACTICAL TECHNICAL KNOWLEDGE based on years of experience in manufacturing mechanical extruded goods, hard and soft rubber molded parts, and lathe cut work. Can handle and organized labor efficiently. Address Box No. 972, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

ENGINEER—CARBON BLACK. WANTED: ENGINEER ABLE TO furnish designs for construction carbon black factory (Channel process). Exact designs of hothouse with all necessary apparatus and auxiliary machinery and with indication of suppliers required. Apply, stating conditions, to D. Watson & Company, 430 Lafayette Street, New York City.

SMALL OHIO RUBBER BAND TUBING PLANT NEEDS EXPERIenced manager for compounding, milling, tubing, vulcanizing. Address Box No. 964, care of INDIA RUBBER WORLD.

WANTED FOR SOUTH AMERICAN LATEX PROOFING PLANT, young energetic man with wide chemical knowledge and mechanical ability and experience. Address Box No. 966, care of INDIA RUBBER WORLD.

WANTED: EXPERIENCED RUBBER EXPERT TO GUIDE AND test rubber molding and sheeting goods in India. Address Box No. 968, care of INDIA RUBBER WORLD.

OPPORTUNITY IN ENGLAND OF POSITION FOR 6 MONTHS, AT either a fee or salary, for a capable man with good knowledge of the manufacture of fine calendered sheet rubbers for the production of Baby Pants, thin Bathing Caps, and fine calendered sheet rubber articles, such as Dress Shields, etc. Reply stating general experience, age, and qualifications. Address Box No. 973, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

AGENCIES WANTED FOR SALE IN EUROPE OF MINERAL OR chemical produces used in rubber trade. Address Box No. 961, care of INDIA RUBBER WORLD.

RUBBER FACTORY SEEKING ADDITIONAL PARTner. Must have knowledge of mechanical rubber goods business, several thousand dollars to invest, and be willing to work and sacrifice to build for the future. Address Box No. 970, care of INDIA RUBBER WORLD.

MANUFACTURERS OF VERY WELL-KNOWN MAKE OF RUBBER air mattress, known in England as "LI-LO", are considering either the manufacture or marketing, or both, of this article in America and would be glad to know of a rubber manufacturer in America who would be interested in this proposition. Address Box No. 974, care of INDIA RUBBER WORLD.

(*Advertisements continued on page* 107)

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	February, 1938		Two Months Ended February, 1938	
UNMANUFACTURED—*Free*	Quantity	Value	Quantity	Value
Liquid latex (solids) ..... *lb.*	3,772,897	$560,883	6,908,421	$1,055,125
Jelutong or pontianak .... *lb.*	1,997,635	355,080	3,336,260	579,523
Balata .... *lb.*	73,299	11,393	124,808	20,351
Gutta percha .... *lb.*	145,367	22,401	251,482	38,684
Guayule .... *lb.*	487,800	60,097	1,692,400	207,782
Siak .... *lb.*	34,200	4,001	45,400	5,179
Scrap and reclaimed ...... *lb.*	297,096	5,894	605,569	9,916
Totals	6,808,294	$1,019,749	12,964,340	$1,916,560
Misc. rubbers (above). 1,000 *lbs.*	6,808	$1,019,749	12,964	$1,916,560
Crude rubber ..... 1,000 *lbs.*	88,211	13,095,429	186,734	28,211,161
Totals .... 1,000 *lbs.*	95,019	$14,115,178	199,698	$30,127,721
Chicle, crude .... *lb.*	1,073,427	$300,299	2,354,139	$704,745
MANUFACTURED—*Dutiable*				
Rubber tires .... *no.*	512	$1,955	2,151	$3,942
Rubber boots, shoes, and overshoes .... *prs.*	3,285	535	9,868	1,255
Rubber soled footwear with fabric uppers .... *prs.*	54,778	13,557	128,973	34,384
Golf balls .... *no.*	100,092	7,544	115,428	8,906
Lawn tennis balls .... *no.*	92,580	8,102	159,564	13,038
Other rubber balls ...... *no.*	250,383	11,835	713,149	36,631
Other rubber toys .... *lb.*	19,689	2,793	107,242	16,773
Hard rubber combs .... *no.*	88,320	5,714	128,748	8,494
Other manufactures of hard rubber	......	664	......	3,849
Friction or insulating tape. *lb.*	5,000	264	15,250	881
Belts, hose, packing, and insulating material	......	7,781	......	12,438
Druggists' sundries of soft rubber	......	9,988	......	18,360
Inflatable swimming belts, floats, etc .... *no.*	42,432	2,892	107,919	7,688
Other rubber and gutta percha manufactures .... *lb.*	64,836	18,869	200,245	45,155
Totals	......	$92,493	......	$211,794

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber .... *lb.*	682,463	$109,756	1,410,693	$228,270
Balata .... *lb.*	26,712	8,440	64,770	20,379
Other rubber, rubber substitutes and scrap .... *lb.*	114,787	14,660	193,218	24,885
Rubber manufactures (including toys)	......	260	......	1,549
Totals	......	$133,116	......	$275,083

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed .... *lb.*	1,052,594	$62,227	2,526,339	$145,363
Scrap .... *lb.*	4,114,072	77,269	8,541,660	153,580
Cements .... *gal.*	17,919	14,968	48,540	40,594
Rubberized automobile cloth, *sq. yd.*	11,122	5,719	39,209	18,655
Other rubberized piece goods and hospital sheeting .. *sq. yd.*	184,645	70,612	334,583	136,870
Boots .... *prs.*	4,495	12,100	24,023	50,538
Shoes .... *prs.*	16,206	7,631	23,233	13,267
Canvas shoes with rubber soles .... *prs.*	18,860	13,616	38,597	32,854
Heels .... *doz. prs.*	41,736	16,276	51,907	23,019
Soling and top lift sheets .. *lb.*	47,308	10,747	75,515	17,368
Gloves and mittens .. *doz. prs.*	10,679	18,885	16,167	31,793
Water bottles and fountain syringes .... *no.*	11,753	4,106	26,896	9,110
Other druggists' sundries	......	36,753	......	78,370
Gum rubber clothing ..... *doz.*	14,125	45,863	43,365	84,073
Balloons .... *gross*	33,306	23,390	54,751	39,492
Toys and balls	......	13,146	......	18,135
Bathing caps .... *doz.*	3,647	6,946	5,295	10,166
Bands .... *lb.*	25,080	9,366	44,529	17,574
Erasers .... *lb.*	31,756	17,464	55,529	31,299
Hard rubber goods				
Electrical battery boxes. *no.*	17,942	11,285	41,419	27,222
Other electrical .... *lb.*	31,578	7,224	80,108	17,896
Combs, finished .... *doz.*	23,518	6,904	58,923	17,525
Other hard rubber goods ..	......	19,337	......	35,234
Tires				
Truck and bus casings .. *no.*	15,536	301,099	35,739	696,958
Other auto casings ..... *no.*	44,351	455,115	101,055	966,050
Tubes, auto .... *no.*	36,317	55,460	94,720	140,558
Other casings and tubes. *no.*	6,257	70,480	10,835	97,471
Solid tires for automobiles and motor trucks .... *no.*	212	5,601	628	15,528
Other solid tires .... *lb.*	63,481	9,942	115,231	18,712
Tire sundries and repair materials	......	49,687	......	103,629
Rubber and friction tape .. *lb.*	63,159	16,578	141,205	36,508
Fan belts for automobiles. *lb.*	29,388	15,260	67,809	35,385
Other rubber and balata belts .... *lb.*	185,914	86,962	392,649	205,316
Garden hose .... *lb.*	55,193	11,077	105,892	20,517
Other hose and tubing .... *lb.*	337,575	126,551	635,544	237,950
Packing .... *lb.*	92,010	45,397	184,358	92,050
Mats, matting, flooring, and tiling .... *lb.*	74,155	13,083	142,420	22,678
Thread .... *lb.*	21,594	18,508	39,714	31,125
Gutta percha manufactures. *lb.*	109,172	29,793	134,987	40,424
Other rubber manufactures ..	......	103,217	......	196,971
Totals	......	$1,925,644	......	$4,007,827

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	Twelve Months Ended December, 1936		Twelve Months Ended December, 1937	
	Pounds	Value	Pounds	Value
UNMANUFACTURED				
Crude rubber, etc.	62,421,709	$9,510,701	80,992,738	$15,672,483
Gutta percha	16,893	8,957	15,928	10,298
Rubber, recovered	10,135,800	451,406	14,979,900	711,893
Rubber, powdered, and gutta percha scrap	3,592,900	52,466	4,054,000	85,023
Balata	14,295	4,016	26,173	9,237
Rubber substitute	464,700	125,034	479,300	110,765
Totals	76,646,297	$10,152,580	100,548,039	$16,599,699
PARTLY MANUFACTURED				
Hard rubber comb blanks ...	......	8,491	......	$9,572
Hard rubber tubes	......	3,412	......	1,004
Hard rubber, n. o. s.	57,068	39,314	66,292	42,117
Rubber thread not covered ..	53,605	35,386	50,170	36,861
Totals	110,673	86,603	116,462	$89,554
MANUFACTURED				
Bathing shoes .... *pairs*	......	......	33,030	$7,870
Belting	......	$87,933	......	111,102
Hose	......	94,459	......	105,143
Packing	......	62,933	......	75,326
Boots and shoes .... *pairs*	191,873	81,042	125,914	101,068
Canvas shoes with rubber soles .... *pairs*	110,390	39,514	126,388	36,142
Clothing, including waterproofed	......	24,635	......	37,381
Raincoats .... *number*	17,222	50,717	9,054	34,962
Gloves .... *dozen pairs*	3,444	8,415	4,205	11,420
Hot water bottles	......	18,055	......	25,642
Liquid rubber compound	......	22,299	......	54,704
Tires, bicycle .... *number*	57,960	23,843	116,959	48,516
Pneumatic .... *number*	15,438	168,741	24,149	265,284
Inner tubes ...... *number*	4,520	9,234	5,992	12,487
Solid for automobiles and motor trucks ..... *number*	310	11,306	545	23,697
Other solid tires	......	8,062	......	17,267
Mats and matting	......	86,811	......	61,004
Cement	......	62,060	......	84,504
Golf balls .... *dozens*	35,945	90,685	33,941	75,112
Heels .... *pairs*	74,144	4,755	160,787	5,812
Other rubber manufactures ..	......	1,089,506	......	1,595,236
Totals	......	$2,045,005	......	$2,789,679
Totals, rubber imports ..	......	$12,284,188	......	$19,478,932

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
UNMANUFACTURED				
Waste rubber	$108,751	......	$146,342	......
MANUFACTURED				
Belting	$576,855	......	$819,353	......
Canvas shoes with rubber soles	1,182,460	......	935,381	......
Boots and shoes	3,545,289	......	4,577,098	......
Clothing, including waterproofed	270,451	......	382,129	......
Heels	189,904	......	193,925	......
Hose	205,626	......	215,319	......
Soles	180,416	......	214,923	......
Tires, pneumatic	6,709,480	......	8,722,371	......
Not otherwise provided for	103	......	350	......
Inner tubes	632,832	......	755,328	......
Other rubber manufactures ..	612,472	$23,349	802,154	$53,810
Totals	$14,105,888	$23,349	$17,618,331	$53,810
Totals, rubber exports ..	$14,214,639	$23,349	$17,764,673	$53,810

Imports by Customs Districts

	March, 1938 *Crude Rubber		March, 1937 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	6,938,946	$1,103,201	11,905,822	$2,294,408
New York	75,255,366	10,623,636	61,497,096	11,481,062
Philadelphia	2,065,173	326,118	1,970,128	338,557
Maryland	976,314	126,316	2,327,789	413,737
Mobile	......	......	311,307	55,635
Georgia	957,750	122,802	......	......
New Orleans	3,094,061	437,840	1,263,878	222,249
Galveston	44,750	5,773	......	......
Los Angeles	4,497,438	666,137	11,111,228	1,962,510
San Francisco	327,915	44,374	903,393	173,593
Oregon	14,220	2,300	13,440	2,927
Indiana	477,798	128,611	......	......
Washington	......	......	68,320	11,823
Michigan	......	......	1,208	302
Ohio	990,308	266,564	318,078	42,716
Colorado	56,000	10,344	223,950	36,254
Totals	95,696,039	$13,864,016	91,915,637	$17,035,773

*Crude rubber including latex dry rubber content.